

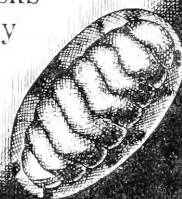
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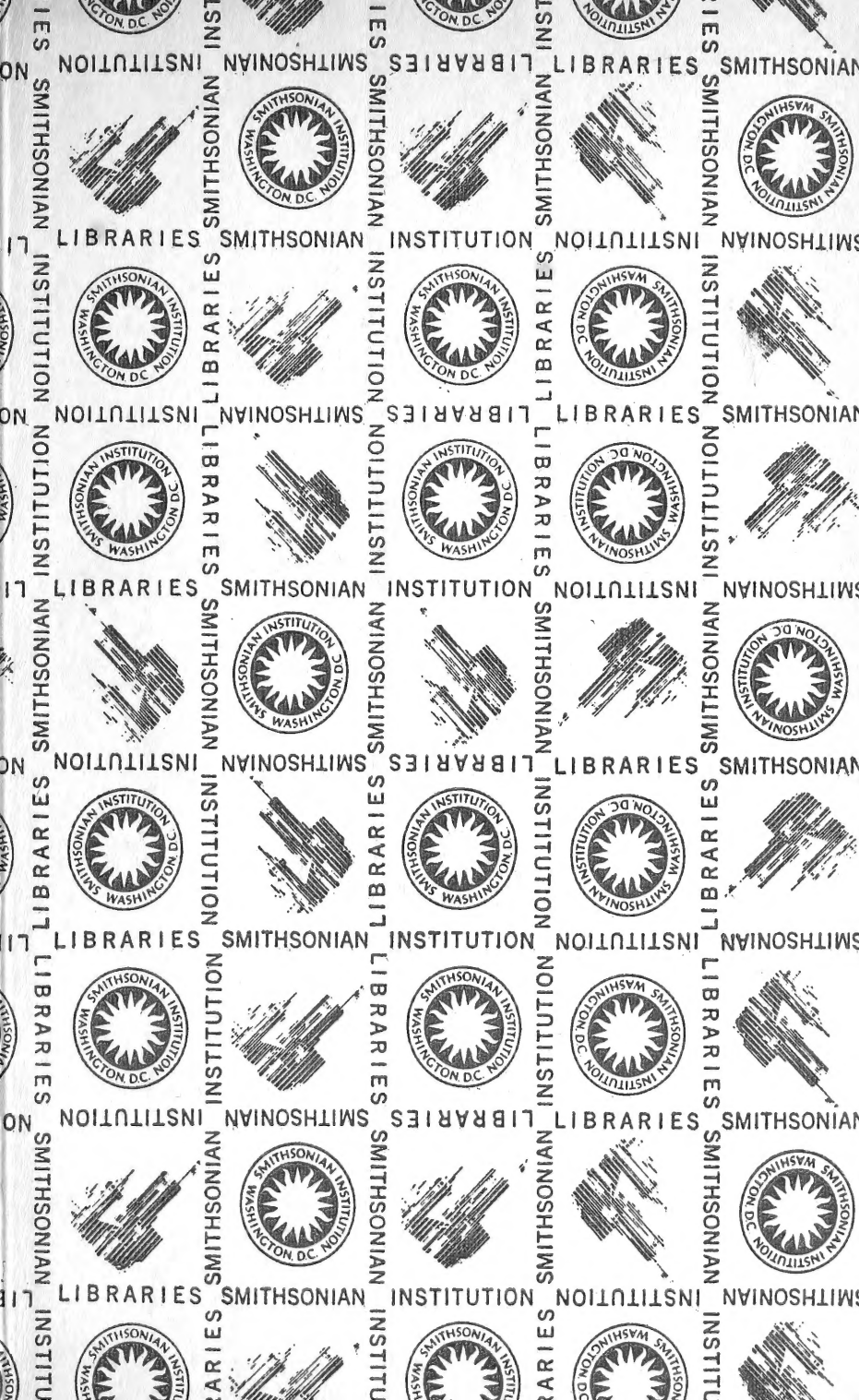
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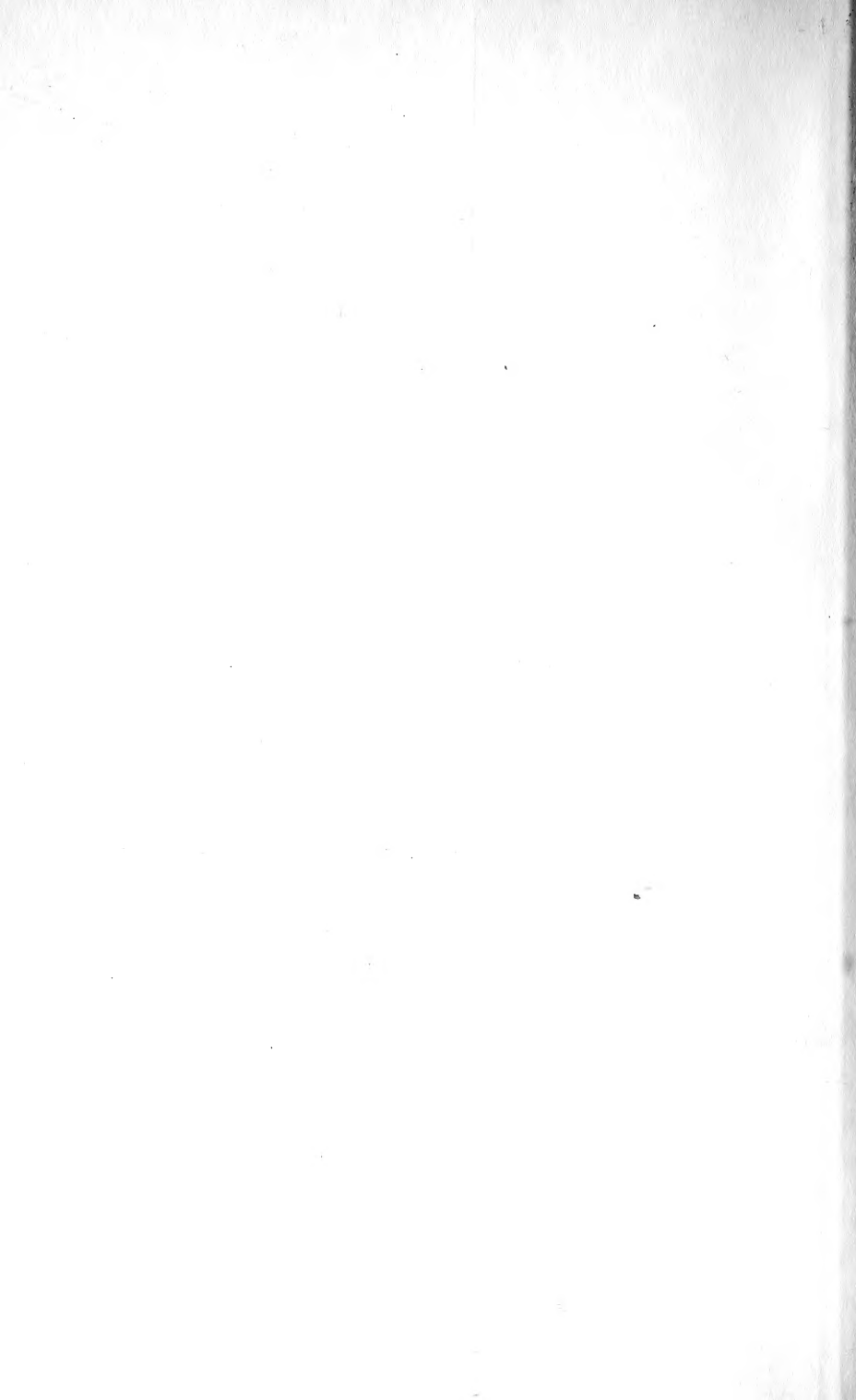
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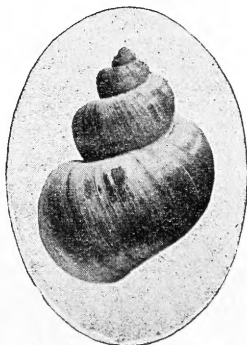
EDITED, UNDER THE DIRECTION OF THE COUNCIL,

BY

WILLIAM E. HOYLE.

VOL. XI.

1904—1906.



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AFTER CAREFUL EXAMINATION OF THE
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AND READ.

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E R R A T A .

- Page 117, line 16, for "volutia" read "veletia."*
 „ „ line 29, for "Retuagiri" read "Ratuagiri."
 „ „ line 30, for "Paugina" read "Pangim."
Page 119, line 6, for "phegedina" read "phagedina."
Page 148, line 20 (from bottom), for "V. ristata" read "V. cristata."
Page 149, line 7, for "Planorbis cristata" read "Planorbis crista."
Page 157, line 28, for "arbustorum" read "lapicida."
Page 260, line 20, for "Robert" read "Roland."
Page 268, line 15 from below, after "American species" insert "Amnicola brownii" and "P. imitator" from next line.
Page 273, line 18, for "laminata" read "lamellata."
Page 316, line 13, for "Terebratula cranium" read "Terebratula vitrea."
Page 351, line 24 (from bottom), for "C. lucida" read "C. lurida."



WILLIAM NELSON.

Born 1835.

Died 1906.

Constitution & List of Members

OF THE

CONCHOLOGICAL SOCIETY

OF

GREAT BRITAIN AND IRELAND.

- 1.—This Society shall be called “**The Conchological Society of Great Britain and Ireland.**”
- 2.—Its object shall be the promotion of the science of Conchology, by the holding of Meetings for the reading and discussion of original papers, by the publication of proceedings, and by the formation of a Library and Collections illustrative of the science.
- 3.—It shall consist of Ordinary and Honorary Members.
- 4.—Ordinary Members shall be proposed by two Members at one meeting, and balloted for at the next. They shall pay, in advance, on the 1st January in each year, a subscription of 5/—, or may compound for life by the payment of Three Guineas. If on December 31st of any year a member shall be three or more years in arrear with his or her subscription, the Council shall erase his or her name from the list of members, and shall take whatever steps seem desirable for recovery of the arrears. The Council shall further report the erasure of such names to the next meeting of the Society with a view to their publication in the Journal.
- 5.—Composition Fees shall be invested in Books, Cabinets, or other permanent property, or in such other manner as the Council may think most conducive to the benefit of the Society.
- 6.—The number of Honorary Members shall be limited to ten, and they shall be exempt from all payments and have the privileges of Ordinary Members.
- 7.—It shall be governed by a Council, consisting of a President, four Vice-Presidents, a Treasurer, a Secretary, a Curator, a Recorder, a Librarian, and six other members, who shall be elected annually by ballot; the voting paper issued to be returned to the Secretary, under cover of sealed envelope, addressed to the Scrutineers. The President and Secretary of the Leeds and London Branches and such other branches as may afterwards be accepted at an annual meeting shall, *ex officio*, also be members of the Council of the Society.
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- 9.—The meetings shall be held monthly, at the time and place fixed by the Council, who shall also have power to arrange such additional meetings as they may think desirable.
- 10.—Three shall be a quorum at all meetings.
- 11.—The Annual Meeting shall be held at such time and place as may be fixed at the previous Annual Meeting, to receive the Reports and Balance Sheet of the out-going Council, and to elect a Council and Officers for the ensuing year.

- 12.—The accounts, before being presented, shall be audited by two members, appointed at a previous meeting.
- 13.—The proceedings shall be published periodically, under the direction of the Council.
- 14.—The Capital and Property shall be vested in two Trustees, elected by the Society.
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 1888. Byne, Loftus St. George, M.Sc., c/o W. G. Marshall, Esq., Morton Manor, near Taunton.

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 1895. Corker, Jas. S., 59, Darncombe Street, Moss Side, Manchester.
 1901. Cox, Jas. C., M.D., F.L.S., Sydney, N. S. Wales.
 1899. Crampton, C. B., M.B., Geological Survey Offices, Sheriff Court Buildings, Edinburgh.
 1890. Crawford, James, c/o J. C. Kemsley and Co., Port Elizabeth, Cape Colony.
 1886. Crick, Walter D., Nine Springs, Cliftonville, Northampton.
 1888. Crouch, Walter, F.Z.S., Grafton House, Wellesley Road, Wanstead, Essex.
 1899. Crowther, J. E., Portland Street, Elland, Yorks.
 1903. Cundall, Jas. W., 8 & 9, Essex Street, Strand, London, W.C.
 1886. DaCosta, Solomon I., 9, Gloucester Square, London, W.
 1897. Dacie, John Charles, 30, Montserrat Road, Putney, London, S.W.
 1904. Dalglish, Gordon, Clairval, Collings Road, Guernsey.
 1893. *Daniel, A. T., M.A., Richmond Terrace, Shelton, Stoke-on-Trent.
 1903. Darbshire, A. D., B.A., University, Manchester.
 1886. Darbshire, Robert D., Victoria Park, Manchester.
 1899. Darnbrough, Frederick, Croft Villa, Eaglescliffe, Yarm-on-Tees.
 1897. Dautzenberg, Ph., 213, Rue de l' Université, Paris.
 1898. Dean, John D., 84, Dale Street, Lancaster.
 1892. Dixon, James Bassett, Ribblesdale House, Preston, Lancs.
 1901. Drummond, Robt., 20, Upper Talbot Street, Blackpool.
 1901. Dyson, W. O., 41, Whiteley Street, Oldham.
 1892. Eccles, John Christopher, 20, Winckley Square, Preston, Lancs.
 1895. Edwards, J. Sumner, Oak Lodge, Harehill Avenue, Leeds.
 1895. Edwards, Thos., Cliftonville House, Equity Rd., Narborough Rd, Leicester.
 1901. Edwards, W. H., Hastings Museum, Victoria Institute, Worcester.
 1891. Elgar, Hubert, Museum and Public Library, Maidstone, Kent.
 1884. Elliot, Edward J., High Street, Stroud, Gloucestershire.
 1901. Ensor, A. R., 60, Lumley Road, Skegness, Lincolnshire.
 1894. Evans, Wm., F.R.S.E., 38, Morningside Park, Edinburgh.
 1886. Eyre, Rev. W. L. W., M.A., Swarraton Rectory, Alresford, Hants.
 1897. *L*Farquhar, John, 3, Rose Terrace, African Str., Grahamstown, Cape Colony.
 1891. Farrer, Captain Wm. James, Chapel House, Bassenthwaite, Keswick.
 1897. Fielding, Clement, M.P.S., Clover Hill, Halifax, Yorks.
 1890. Fierke, Frederick Wm., 73, Redbourne Street, Hull.

1884. *L* Fitzgerald, Rev. H. Purefoy, Wellington College, Berks.
 1886. Fitzgerald, Mrs. J., Kapai, Maidstone Road, Headcorn, Kent.
 1898. Fitzsimons, J. B., M.D., 14, Owen Street, Hereford.
 1892. Fulton, Hugh, 15, Station Parade, Kew Gardens, near London.
 1887. Gerland, Conrad, M.Sc., Ph.D., F.C.S., Meadow Bank, Accrington.
 1898. Glover, Miss Maria, 124, Manchester Road, Southport, Lancs.
 1886. *L* Godlee, Theo., Whips Cross, Walthamstow, Essex.
 1897. Godwin-Austen, H. H., Lt.-Col., F.R.S., etc., Nore, Hascombe, Godalming, Surrey.
 1902. Gower, Harry D., 55, Bensar Road, Croydon.
 1886. Greene, Rev. Carleton, M.A., Gt. Barford Vicarage, St. Neots, Huntingdon.
 1904. Grierson, P. H., Land Commission Office, Dublin.
 1901. Gubbins, Mrs., Westwood Ho!, N. Devon.
 1890. Gude, G. K., F.Z.S., 114, Adelaide Road, Hampstead, London, N.W.
 1886. Gwatkin, Rev. Prof. H. M., D.D., M.A., 8, Scrope Terrace, Cambridge.
 1897. Hall, Thos. Bird, Larch Wood, Rock Ferry, Cheshire.
 1902. Hall, W. J., Manchester Museum, Owens College, Manchester.
 1902. Hampson, Travis, Nuthurst, Hartopp Road, Four Oaks, Sutton Coldfield.
 1895. Hann, Rev. Adam, 100, Union Street, Willenhall, Staffordshire.
 1895. Hardy, John Ray, Manchester Museum, Owens College, Manchester.
 1895. Hardy, John, 11, Stockton Road, Chorlton-cum-Hardy, near Manchester.
 1887. Hargreaves, J. A., 3, Ramshill Road, Scarborough, Yorks.
 1897. Harrison, Miss G. M., 14, Queen's Road, Southport, Lancs.
 1889. Hartley, Alfred, 19, Thorpe Garth, Idle, near Bradford, Yorks.
 1887. Harvard, T. Mawson, 23, Northbrook Road, Lee, London, S.E.
 1891. Hawell, Rev. John, M.A., Vicarage, Ingleby Greenhow, Middlesborough.
 1903. Hawkins, John, J.P., 35, Avenue Road, Grantham.
 1887. Heathcote, Wm. Henry, F.L.S., 119a, Fishergate, Preston, Lancs.
 1896. Herdman, Prof. W. A., D.Sc., F.R.S., The University, Liverpool.
 1887. Hey, Thomas, 8, Bloomfield Street, Derby.
 1895. Hibbert, Charles R. C., Riccard's Down, Abbotsham, Bideford, Devon.
 1895. *P* Hickson, Prof. Sydney J., D.Sc., M.A., F.R.S., University, Manchester.
 1893. Hill, John, Little Eaton, near Derby.
 1886. *L* Hillman, Thomas Stanton, Eastgate Street, Lewes, Sussex.
 1886. Holmes, W. J. O., F.L.S., Strumpshaw Hall, Norwich.
 1891. Horsley, Rev. J. W., St. Peter's Rectory, Walworth, London, S.E.
 1884. Howell, George O., 210, Eglinton Road, Plumstead, Kent.
 1892. Howorth, Sir Henry Hoyle, K.C.I.E., M.P., F.R.S., etc., 30, Collingham Gardens, London, S.W.
 1886. *P* Hoyle, W. E., M.A., D.Sc., Director of the Manchester Museum, Owens College, Manchester.
 1895. Hudson, Rev. Hy. A., 445, Stretford Road, Manchester.
 1901. Jackson, J. W., 18, Bedford Avenue, Manley Park, Manchester.
 1886. James, John H., A.R.I. Cornwall, 3, Truro Veau Terrace, Truro.
 1891. Jenner, James Herbert Augustus, F.E.S., 209, School Hill, Lewes, Sussex.
 1894. Jones, Kenneth Hurlstone, M.B., F.L.S., R.N. Barracks, Chatham, Kent.
 1889. Jordan, H. K., F.G.S., The Knoll, Clytha Park, Newport, Monmouthshire.
 1901. Jukes-Browne, A. J., F.G.S., Floriston, Cleveland Road, Torquay.
 1897. Kendig, Rev. Amos B., D.D., 86, Vernon Str., Brookline, Mass., U.S.A.
 1897. *L* Kennard, A. S., Benenden, Mackenzie Road, Beckenham, Kent.
 1902. Kensett, Percy F., Broadmeadow, Coombe Lane, Wimbledon, London, S.W.

1897. Kenyon, Mrs. Agnes Fleming, 291, Highett St., Richmond, Melbourne, Victoria.
1887. Kew, H. Wallis, F.Z.S., 9, Queen's Road, Bromley, Kent.
1900. Killingbeck, J. H., Llwyn On, Abbey Road, Llangollen, N. Wales.
1889. Knight, Rev. G. A. Frank, M.A., F.R.S.E., St. Andrew's Manse, Auchterarder, Perthshire.
1901. Laidlaw, F. F., B.A., University, Manchester.
1899. Lancaster, Ernest Le Cronier, B.A., M.B., Winchester House, Swansea, S. Wales.
1879. Laver, Henry, M.R.C.S., F.L.S., Head Street, Colchester, Essex.
1894. Lawson, Peter, 11, The Broadway, Walham Green, London, S.W.
1900. Lebour, Miss M. V., Radcliffe House, Corbridge-on-Tyne, Northumberland.
1878. Leicester, Alfred, Scottdale, New Ferry, Cheshire.
1899. Lightfoot, Robert M., South African Museum, Cape Town.
1903. Linter, Miss J. E., Saville House, Twickenham.
1896. Linton, John, 25, Wordsworth Road, Smallheath, Birmingham.
1897. *L* Lodder, Miss Mary, Bank of Australasia, Launceston, Tasmania.
1895. Loydell, A., 36, Milton Road, Acton, London, W.
1898. Lucas, B. R., 3, Dyar Terrace, Winnington, Northwich, Cheshire.
1891. Lyons, Lady, Kilvrough, Parkmill, R.S.O., Glamorganshire, S. Wales.
1889. MacAndrew, James J., F.L.S., etc., Lukesland, Ivy Bridge, Devonshire.
1903. McClelland, Hugh, Bryn, Somerville Road, Sutton Coldfield.
1885. McKean, Kenneth, F.L.S., Lloyds, London, E.C.
1886. McMurtrie, Rev. John, M.A., D.D., 13, Inverleith Place, Edinburgh.
1884. Madison, James, 167, Bradford Street, Birmingham.
1885. Marquand, Ernest D., A.L.S., 14, Saumarez Street, Guernsey.
1887. Marshall, J. T., Arlesey Dene, Torquay, Devonshire.
1887. *P* Masefield, John R. B., M.A., Rosehill, Cheadle, Staffordshire.
1899. Mason, G. E., 81, Beaufort Street, Drayton Gardens, London, S.W.
1897. May, William Lewis, F.R.S. Tasm., Forest Hill, Sandford, Tasmania.
1889. Mayfield, Arthur, Mendlesham, Stowmarket, Suffolk.
1880. *P* Melvill, James Cosmo, M.A., F.L.S., Brook House, Prestwich, Manchester.
1891. Middleton, Robert, Gledhow, near Leeds.
1888. Milne, J. Grafton, Holly House, Plaistow, London, E.
1904. Milne, James W., Foylemore, St. Jude's Avenue, Belfast.
1879. Milnes, Rev. Herbert, M.A., Darley House, Berkeley St., Cheltenham.
1891. Mitchell, James, 240, Darnley Street, Pollokshields, Glasgow.
1902. Moore, Chas. H., 5, Mill Street, Stocks Lane, Stalybridge.
1891. Morris, Cecil Herbert, Lewes, Sussex.
1899. Morris, G. M., 9, Chandos Road, Chorlton-cum-Hardy, Manchester.
1891. Moss, William, F.C.A., 13, Milton Place, Ashton-under-Lyne.
1903. Nash, P. B., 135, Melfort Road, Thornton Heath, Surrey.
1899. Neild, J. E., Gilda Brook Road, Eccles, near Manchester.
1887. Newstead, A. H. L., B.A., 38, Green Street, Bethnal Green, London, E.
1891. Newton, Richard Bullen, F.G.S., 7, Melrose Gardens, West Kensington Park, London, W.
1891. *P* Norman, Rev. Canon Alfred Merle, D.C.L., F.R.S., etc., The Red House, Berkhamstead.
1903. Northey, Rev. A. E., M.A., Lisworney, Torquay.
1901. Norton, Miss E. M., 20, Eastfield Road, Westbury-on-Trym, near Bristol.
1901. Oelrichs, W., 22, Hackins Hey, Liverpool.
1887. Oldham, Charles, Brook Cottage, Knutsford, Cheshire.

1899. Orr, Hugh Lamont, 29, Garfield Street, Belfast.
1896. Overton, Harry, Ingleside, Clifton Road, Sutton Coldfield, Warwickshire.
1903. Pace, S., Marine Biological Laboratory, Plymouth.
1900. Pannell, Chas., 13, East Street, Haslemere, Surrey.
- 1882.*P* Parke, George H., F.L.S., etc., St. John's, Wakefield, Yorks.
1887. Parry, Lieut.-Col. G. S., 18, Hyde Gardens, Eastbourne, Sussex.
1898. Partridge, F. J., 75, High Street, Barnstaple, N. Devon.
1902. Pattison, Ernest, 52, Regent Road, Leicester.
1886. Pearce, Rev. S. Spencer, M.A., Long Combe Vicarage, near Woodstock Oxfordshire.
1901. Penrose, G., Royal Institution of Cornwall, Truro.
1896. Percival, A. Blayney, Somerset Court, Brent Knoll, Somerset.
1886. Ponsonby, John H., F.Z.S., 15, Chesham Place, London, S.W.
1898. Poore, Arthur S., Heather View, West Heath Road, Bostall Heath, Abbey Wood, Kent.
1895. Powell, Mrs. A., Nant-y-Velin, Criccieth, N. Wales.
1903. Preston, Henry, F.G.S., Hawthornden Villa, Spittlegate, Grantham.
1897. Preston, Hugh Berthon, F.Z.S., 3, Sydney Terrace, Fulham Road, London, S.W.
1896. Ragdale, John Rowland, The Beeches, Whitefield, near Manchester.
1899. Ramanam, Vedaraniyam Venkata, M.A., F.Z.S., Tenali, Kistna District, S. India.
1904. Redding, J. R., 173, Clonliffe Road, Dublin.
1896. Rhodes, John, F.E.S., 360, Blackburn Road, Accrington, Lancs.
1900. Richards, C. P., Mission House, Stenalees, St. Austell, Cornwall.
1898. Roberts, A. William Rymer, The Common, Windermere.
- O P* Roebuck, Wm. Denison, F.L.S., 259, Hyde Park Road, Leeds.
1901. Rooth, J. A., M.R.C.S., Stanley House, Hounslow.
1893. Roseburgh, John, Market Square, Galashiels, Roxburgh.
1892. Rosevear, John Burman, 109, New King's Rd., Fulham, London, S.W.
- 1877.*P* Scharff, Robert F., Ph.D., M.R.I.A., Tudor House, Dundrum, Dublin.
- 1895.*L* Schill, C. H., The Elms, Byrom Lane, Macclesfield.
1904. Scott, Miss Gwynedd, West Quarter, Hexham.
1886. Scott, Thomas, F.L.S., 3, Menzies Road, Torry, Aberdeen.
1893. Shackleford, Rev. Lewis John, 24, Chatburn Road, Clitheroe, Lancs.
1892. Shillito, John G., 20, Elmore Road, Sheffield.
1895. Sich, Alfred, F.E.S., Brentwood, 65, Barrowgate Rd., Chiswick, London, W
1896. Sidebotham, Dr. E. J., Erlesdene, Bowdon, Cheshire.
1884. Skilton, Mrs. Mary, 21, London Road, Brentford, Middlesex.
1902. Smallman, Raleigh S., Carlton House, Herne Hill, London, S.E.
1903. Smallwood, Henry W., Holly Mount, Church Road, Moseley, Birmingham.
1903. Smallwood, Jas. Clarence, Holly Mount, Church Rd., Moseley, Birmingham.
1886. Smart, Rev. R. W. J., M.A., Parkham Rectory, Bideford, N. Devon.
- 1886.*P* Smith, Edgar A., F.Z.S., Natural History Museum, Cromwell Road, London, S.W.
1892. Smith, Mrs. Louisa J., Monmouth House, Monmouth St., Topsham, Exeter.
- 1899.*L* Smith, Mrs. Lucy A., Cricklade Street, Cirencester.
1894. Smith, Wm. Chas., 7, Vanston Place, Walham Green, London, S.W.
1896. Smith, Wm. Rayson, Harleston, Norfolk.
1900. Solly, E. H., 3, South Street, Deal, Kent.
- 1886.*L P* Somerville, Alex., B.Sc., F.L.S., 4, Bute Mansions, Hillhead, Glasgow.
1887. Somerville, Rev. James E., M.A., B.D., Castellar, Crieff, N.B.
1902. Sorby, Henry Clifton, LL.D., F.R.S., Broomfield, Sheffield.

1886. Sowerby, Geo. Brettingham, F.L.S., 15, Station Parade, Kew Gardens, near London.
1892. Span, Bartlet, Woodlands, Tenby, South Wales.
1900. Stacey, John, 22, Nithdale Road, Plumstead, Kent.
1886. Standen, Robert, 113, Sewerby Street, Alexandra Park, Manchester.
1888. Stanley, Frederick, Rokeby, Edgar Road, Margate, Kent.
1903. Stelfox, A. W., Oakleigh, Ormeau Road, Belfast.
1888. Stirrup, Mark, F.G.S., High Thorn, Bowdon, Cheshire.
1896. Stonestreet, Rev. W. T., Arnside, Prestwich Park, Manchester.
1885. *L* Storey, J. A., B.A., Mafeking Villa, Locking Road, Weston-super-Mare.
1897. Tracey, Bernard, M.B., Sutton Bonnington, Loughborough.
1890. Stubbs, Arthur Goodwin, Staincliffe, Granville Road, Eastbourne.
1893. Stump, Edward Consterdine, 16, Herbert St., Moss Side, Manchester.
1899. Sturt, W. Neville, India Office, Westminster, London, S.W.
1895. Swanton, E. W., The Educational Museum, Haslemere, Surrey.
1888. *P* Sykes, Ernest Ruthven, B.A., F.L.S., etc., 3, Gray's Inn Place, Gray's Inn, London, W.C.
1895. Sykes, Robert Dardsley, Lostock Hall, near Preston, Lancs.
1895. Taylor, Frederick, 42, Landseer Street, Park Road, Oldham, Lancs.
1897. Taylor, Rev. George W., F.R.S. Canada, etc., St. Matthew's Rectory, Wellington, British Columbia.
1904. Taylor, Gerald Medland, Rossall School, Fleetwood.
- O P* Taylor, John W., F.L.S., North Grange, Horsforth, Leeds.
1903. Thaunum, D., 5, Church Street, Hilo, Hawaiian Islands.
1886. Tomlin, J. R. le Brockton, M.A., Estyn, Chester.
1898. Turner, E. Hartley, A.C.A., 33, Bairstow Street, Preston, Lancs.
1899. Vaughan, J. Williams, J.P., The Skreen, Erwood, R.S.O., Radnorshire, S. Wales; winter address: Bryn-y-Mon, Tenby, S. Wales.
1897. Vignal, Louis, 28, Avenue Duquesne, Paris.
1902. Vincent, C. W., 39, West Bank, Stamford Hill, London, N.
1902. Wadsworth, J. T., 15, Deramore Street, Moss Side, Manchester.
1898. Wakefield, H. Rowland, 7, Montpelier Terrace, Swansea, S. Wales.
1891. Walker, Bryant, 18, Moffat Building, Detroit, Michigan, U.S.A.
1900. *L* Watson, Hugh, Bracondale, The Avenue, Cambridge.
1886. *P* Watson, Rev. R. Boog, LL.D., F.L.S., etc., 11, Strathearn Pl., Edinburgh.
1900. Webb, Walter, F., 416, Grand Avenue, Rochester, N.Y., U.S.A.
1895. Webb, Wilfred Mark, F.Z.S., 7, Campbell Road, Hanwell, London, W.
1902. Weeks, Wm. H., jr., 508, Willoughby Avenue, Brooklyn, U.S.A.
1895. Welch, Robert John, 49, Lonsdale Street, Belfast.
1897. West, H. J., 167, Goodrich Road, East Dulwich, London, S.E.
1886. Whitwell, Wm., F.L.S., Underhill, Kidderminster Road, Hagley, near Stourbridge.
1901. Wilde, J. W., 17, Hendon Road, Sparkbrook, Birmingham.
1889. Williams, John M., 20, Hackins Hey, Liverpool.
1891. Williamson, Rev. Charles Arthur, M.A., 14, Upper Mount Street, Dublin.
1890. Wood, Albert, Midland Lodge, Sutton Coldfield, Warwickshire.
1901. *L* Woodruffe-Peacock, Rev. E. A., F.L.S., etc., Cadney, Brigg, Lincs.
1898. Woods, Henry, M.A., F.G.S., St. John's College, Cambridge.
1886. *L* Woodward, Bernard B., F.L.S., etc., 120, The Grove, Ealing, London, W.
1903. Worsdale, R., 75, Dudley Road, Grantham.
1895. Wright, Charles East, Woodside, Rockingham Road, Kettering.

OBSERVATIONS ON THE HABITS AND REPRODUCTION OF *PALUDESTRINA TAYLORI*.

By JOHN W. JACKSON AND FRED TAYLOR.

(Read before the Society, November 11, 1903).

THIS species was first discovered on April 28, 1900, in the canal near Fairfield Locks, Droylsden, Lancashire, by one of the present writers, associated with *Paludestrina jenkinsi*, of which species it was at first thought to be a variety. On Sept. 23 of the same year, numbers of *P. taylori* were taken in a short arm of the Peak Forest Canal at Dukinfield, Cheshire, just across the River Tame; and from this point it was found to occur at intervals along the canal as far as Woodley, being very abundant in the luxuriant bed of reed meadow grass (*Glyceria aquatica*) near the bridge, over which passes the main line of the Great Central Railway. Living specimens from Dukinfield were submitted to Mr. Edgar A. Smith, in October, 1900, who described them under the name of *Paludestrina taylori*.¹ He, however, made no mention of its life-history or reproduction, and as the following observations relate thereto, they will be interesting.

The species very much resembles *Bithynella (Hydrobia) steeni* v. Martens, and Mr. J. T. Marshall, with whom we have been in correspondence, is of opinion that it is undoubtedly that species, which, he says, he has had in his collection for years under the name of *Paludestrina steeni*, his specimens coming from Sorø, S. Denmark.

In answer to our request, Mr. E. A. Smith procured specimens of *B. steeni* from the author, sending him in return specimens of *P. taylori* for his inspection. Prof. v. Martens replied that, in his opinion, *P. taylori* is specifically distinct, to use his own words:—"It differs well from my *Bithynella steeni* by its more conical broader form." Mr. Smith, however, on comparing the two shells, cannot see any reason for separating them, but he goes on to say:—"In a genus where the shell characters are so ill defined it becomes necessary to see what an examination of the living animal might reveal, before we can say that shells, apparently the same, are conspecific, and until this is done in the case of *B. steeni*, I see no reason for departing from the name of *P. taylori*."

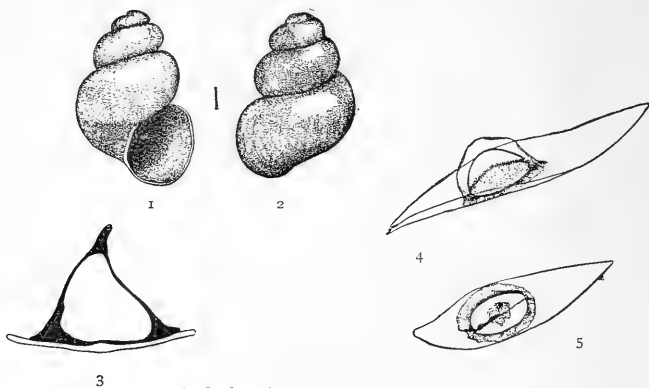
It will be interesting to mention here that Mr. R. Bullen Newton records the occurrence of *B. steeni* in post-pliocene strata in England.² In the early summer of 1901, whilst collecting *P. taylori* in the reed bed at Dukinfield, small egg-capsules were found attached to the decaying stems of the reeds in the shallow water, and with the idea

¹ *Ann. Mag. Nat. Hist.* (7), vol. 7, p. 191, Feb., 1891.

² *J. Conch.*, vol. 10, p. 62, April, 1901.

that they might prove to be the ova of *P. taylori*, adult specimens of that species were collected and placed in glass vessels with ordinary tap water. In a very short time the little snails commenced to deposit similar capsules on the sides of the vessels, thus proving their identity with those previously observed on the reeds.

These egg-capsules, which are deposited singly, are very similar to those of the North American *Annicola porata*, described by Dr. Wm. Stimpson, in his "Researches upon the Hydrobiinæ and allied forms."¹ They are somewhat lenticular in shape, horny, transparent, and are attached to objects by a flat base. The free portion is furnished along its length with a broad thin laminated keel. The contained egg resembles very much a small fig seed, both in size and colour, and floats freely in the surrounding fluid. The capsules are deposited during the months of May, June, and July, and develop in about six weeks.



Paludetrina taylori.

1, 2, Views of the shell; the line between them shows the natural size; 3, section of leaf and egg-capsule attached to it; 4, view of leaf, with empty egg-capsule attached; 5, leaf with capsule containing a partly-developed embryo; figs. 3-5 magnified.

During the two succeeding summers we have had the species under close observation, with the same results; the egg-capsules were deposited, and in a few days a change could be seen in the shape of the contained egg. The first noticeable alteration occurred about ten days after deposition, when a rotatory motion was observable in the ova, and they began to lose their spherical shape. About the middle of the fifth week they had developed considerably, and at this period the protoconch, consisting of about one-and-a-half whorls, was to be seen distinctly through the envelope of the capsule. These shells were of a semi-transparent horn colour, and the animals could be seen gently moving about. From this time they gradually increased in size until they filled the whole of the capsule, which then burst, and the young emerged.

During the whole of our observations, we failed to notice the precise method of copulation, though we repeatedly saw individuals in close contact, fully extended, and perfectly quiescent for several minutes at a time, and we have a strong suspicion that the act of reproduction took place on these occasions.

It appears, then, from our observations that *P. taylori* differs from other species of *Paludestrina* (which are acute-spined, and viviparous) in having a shell very blunt at the apex, and in being oviparous, and in these important characters it agrees with the North American genus *Amnicola*, to which we think it ought in future to be referred.

Our best thanks are due to Mr. A. D. Darbishire for kindly making the accurate drawings which accompany this paper, and to Messrs. E. A. Smith, J. T. Marshall, E. v. Martens, R. Standen, and J. Cosmo Melvill for information and suggestions.

Paludestrina anatina Drap. new to Britain.—Early in the present year I received from Mr. Claude Morley, F.E.S., of Ipswich, a small box of shells which he had gathered on May 19th, 1898, from amongst lacustrine rejectamenta on the margin of Oulton Broad, Suffolk. The shells were all dead, and included a few examples of *Paludestrina jenkinsi* Smith, as well as of various common land and freshwater species, but the bulk of the material consisted of a small *Bythinia*-like shell which was new to me, and which was subsequently identified by Dr. Boettger as *Pseudamnicola anatina* Drap. This species has a wide range abroad, and occurs in the south of France, Spain, Portugal, Morocco, Balearic Isles, Corsica, Italy, Sicily, and Malta. Westerlund also quotes a locality "Adros": if, as I suppose, this is a misprint for "Andros," the species may be said to inhabit all the south of Europe. Dr. Boettger questions its distinctness from *Paludestrina* (or as he prefers to call it *Pseudamnicola*) *similis* Drap., and says that he finds great difficulty in separating the two forms. If our recently extinct species from the Thames marshes is really the *P. similis* of Draparnaud, I do not follow him in this. *P. similis* with its large swollen body-whorl and short spire seems abundantly distinct from *P. anatina*, which has a moderate body-whorl and a longer and somewhat turreted spire. There will be the same speculation over the appearance of this shell in Britain as there was over that of *P. jenkinsi* and *P. taylori*. The proximity of Lowestoft is suggestive, but I do not know whether it has any trade with the Mediterranean.—J. R. LE BROCKTON TOMLIN (*Read before the Society*, April 8, 1903).

Jaminia muscorum m. *sinistrorsum*.—Whilst sifting material from a "shell pocket" on the sand-hills at Abersoch, North Wales, on June 10th, 1903, I had the good fortune to find a fine example of this along with numerous specimens of the typical form and its variety *alba*. So far as I know, this is the first recorded occurrence of a sinistral specimen of this species. The pocket from which I obtained the specimen was only two or three yards from the edge of the cliff, and was very prolific in specimens—*Helix acuta*, *H. caperata*, and *H. itala* were there in thousands, along with *Cochlicopa lubrica*, *Lauria cylindracea*, *Vertigo pygmaea*, *V. substriata*, and *V. antivertigo*.—J. W. BALDWIN (*Read before the Society*, Oct. 14, 1903).

NOTE ON *CASSIS PAUCIRUGIS* Menke.

BY AGNES F. KENYON.

(Read before the Society, Sept. 9th, 1903.)

1843. *Cassis paucirugis* Menke, Moll. Nov. Holl., p. 23, no. 107.
 1848. *Cassis paucirugis* Reeve, Conch. Icon., vol. 5, pl. 8, fig. 19.
 1844. *Cassis pyrum* Lam., An. s. Vert., vol. 10, p. 33.
 1848. *Cassis pyrum* Reeve, Conch. Icon., vol. 5, pl. 11, fig. 29.
 1857. *Cassis pyrum* Reeve, Conch. Cab., p. 29, pl. 47, fig. 56.
 1872. *Cassis pyrum* var. *nivea* Brazier, Proc. Zool. Soc., p. 616, pl. 44, fig. 1.
 1880. *Cassis pyrum* Hutton, Man. New. Zeal. Moll., p. 66.
 1885. *Cassis achatina* var. *pyrum* Tryon, Man. Conch., vol. 7, p. 278, pl. 8, fig. 96 to 98.
 1885. *Cassis tumida* Petterd, Proc. Roy. Soc. Tasmania, p. 321.
 1899. *Cassis pyrum* Pritchard & Gatliff, Proc. Roy. Soc. Vict., p. 189.
 1901. *Cassis pyrum* Tate & May, Census Marine Moll., Proc. Linn. Soc. N.S.W., p. 456.

THE descriptions of *C. paucirugis* and *C. pyrum* do not quite coincide, but it seems to be generally accepted by the scientific world that they are synonyms, although it is singular, almost astonishing, that their resemblance escaped Reeve's notice, especially as he mentions having seen several specimens of *C. paucirugis*, including the type specimen forwarded to him by Dr. Menke. The fact, therefore, of Reeve not appreciating that both species of *Cassis* could be classed under the same appellation is accentuated by his remarks about *C. zealandica* Lam. "not having characters of sufficient permanence to distinguish it." *Cassis pyrum* is a comparatively plentiful shell, and is also very variable in its characters, but seems to retain a thin and light fabric in almost every instance, unlike most forms of the genus *Cassis*, which are of a heavier and more solid construction. I should be inclined to consider that the smooth oblong variety with convex whorls is the best representative of *C. pyrum*, "the pear *Cassis*," an unusually fine specimen of which has just come to light at San Remo, Westernpoint Bay, Victoria. Hitherto, the size of the largest specimens known has been from 2.5 to 3.5 inches in length, and some specimens are very much smaller, but the specimen in question is 4.75 inches in length, 8 inches in circumference, 3.5 inches breadth, 2.5 inches lateral height. This specimen is quite smooth and inflated without varices, the blackish-brown blotches behind the reflected lip are not visible on any other portion of the surface, which is covered with irregular rows of chestnut-brown maculations. The blackish-brown blotches I consider the same as are to be observed behind the

reflected lip of *C. flammea* and *C. fimbriata*, etc., and are in no way connected with the sculpture of the shell. I have never seen a single specimen with these blotches behind the varices, except where there is a double-lipped specimen, which may be regarded rather as a deformity. The dentition also appears to be unequally distributed, irrespective of size or shape; the specimens with tabulated whorls should, I think, be ascribed to *C. paucirugis*, but the thin slender lightness of the shell is in some instances remarkable. A specimen displaying finely marked dentition and thickened reflected lip, channelled towards the body whorl, which has faint bands of chestnut colour terminating at the lip, where they become darker and spreading round the lip, showing from the front aspect, interior of aperture saffron colour, is a typical *C. paucirugis* except in the ivory-white colour which may only have been caused by the type specimen being a dead shell, and therefore deprived of colour. Several of the smaller ovate specimens have a number of transverse grooves towards the base, and are distinctly banded. The variety of form, sculpture, etc., seems worthy of remark.

In conclusion, there seems to be almost no special characteristic that is developed in only one example of this species; they seem to run by means of intermediate examples from one to another, smooth convex whorls are sometimes accompanied by dentition; tabulated whorls also sometimes have dentition; tuberculations also do not constitute a distinction, as they are in like manner unequally distributed; and as to var. *nivea*, I think, as its name implies, that it is a white or colourless variety of the above.

Report on the Miller's Dale Ramble.—August 15th, the day chosen for this ramble, proved to be one of the worst experienced for some time. The weather of the previous day had been anything but appropriate, there being exceedingly heavy rain at intervals, accompanied by thunder and lightning, and the 15th was no improvement on this, as the morning opened with fine drizzling rain which continued throughout the day. As on the previous ramble, the attraction was the taking of *Cæcilioides acicula*. In spite of the rain, some sixty specimens were soon collected, a fair percentage of them being alive. Several other shells were collected, most of which were recorded last year. Some interesting varieties, however, of *Helix hortensis* were gathered, chief of which were vars. *lutea*, *pallida*, and *coalita*; *Helix arbustorum* was present in good numbers, including its var. *marmorata*. The above two species were confined to a large growth of nettles at the foot of the rocks just below the railway viaduct. The slugs were represented by *Arion ater*, *A. hortensis*, and *Agriolimax agrestis*, all of them typical and occurring in great profusion all over the place. It is rather surprising that, considering the weather, so few shells were really active, but this may be owing to the excessive cold wind at the time.—JOHN W. JACKSON (*Read before the Society*, Sept. 9th, 1903).

ISAAC COOKE THOMPSON, F.L.S.

BY W. E. HOYLE, D.Sc.

(Read before the Society, November 11, 1903).

THE Society, in common with the scientific world at large, has to deplore a serious loss in the person of Mr. Isaac C. Thompson, of Liverpool, who was suddenly struck down by apoplexy in full vigour only five days ago. He was born at Birkenhead, in 1843, and descended from a family well and honourably known in the Society of Friends. His mother was one of the ministers of that body, and both for her character and discourses much valued by the Liverpool meeting. He inherited his scientific tastes from his father, who was a member of the old-established firm of Thompson and Capper, pharmaceutical chemists, and was fond of assembling a number of congenial friends around him to spend the evening in studying specimens with the microscope. If report speaks truly these gatherings had a well-developed social as well as a scientific side.

Isaac Thompson was educated at Kendal, and subsequently at York, and then, on leaving school at the age of fifteen, was sent into his father's place of business. At this time his chief scientific interest was in botany; he was passionately fond of flowers, and so successful as a collector that he won a prize offered by the Liverpool Royal Infirmary for the best series obtained in the neighbourhood of that city. It is recorded in the family annals that being sent one day on a message to Lord Derby's house, he picked on the way all the flowers not previously known to him, mostly what would be termed weeds. Not wishing to appear at the door with these treasures in his hands, he concealed them until his return. His surprise may be imagined when two ladies of Lord Derby's family called at the shop next day with a choice bouquet for "the young man who was so fond of flowers." Eventually he became a partner in the business, and on his father's death, at the age of fifty-seven, took a very active share in the management of the firm.

Turning to Thompson's scientific work, that for which he will best be known by posterity will be his long series of papers on the smaller Crustacea, beginning in 1886 with a "Report on the Copepoda of Liverpool Bay," and proceeding steadily and with increasing importance and culminating in a long report on the Copepoda collected by Professor Herdman in Ceylon—a monumental work occupying eighty pages, and illustrated by twenty plates, undertaken in collaboration with Mr. Andrew Scott, and, by a curious coincidence, sent to press on the very day of his death.

Isaac Thompson was not, however, a mere specialist among minute Crustacea; he was a naturalist of extensive knowledge and broad sympathies. In conjunction with his friend Dr. Herdman, he took an active part in the foundation and subsequent management of the Liverpool Marine Biology Committee, founded for the systematic investigation of the fauna of the district. He filled for years the important office of treasurer, watched over its small beginnings in the Marine Laboratory on Puffin Island, and eventually saw it installed in more commodious premises at Port Erin.

He was also an original member of the Liverpool Biological Society, and was recently elected to its Presidential Chair. His interest in science was, however, even wider than that of the naturalist pure and simple: he had a sympathy with, and understanding of, the problems of physical science, and was one of the founders of the Liverpool Physical Society.

But he was more than a scientist: he was intensely human in all his thoughts and feelings; full of warm sympathetic interest in all that concerned the welfare of his fellow-men. In him we have lost at one blow the earnest student of nature, the sound financier, the active clear-minded administrator, the sympathetic neighbour, and the true-hearted comrade. What wonder, then, that his friends and colleagues feel the loss a heavy one.

Fish and their relation to *Paludestrina jenkinsi*.—It has for sometime been a noticeable fact that where *Paludestrina jenkinsi* occurs it is generally in great abundance. It has also been stated to have "taken over" a locality, to the exclusion of other shells, but I do not remember having seen any reason assigned for this. Some little time ago I was able to obtain a fair quantity of this shell and determined to watch the effect of its introduction among various fish, and the result of the experiments may be worthy of notice. This shell I find cannot exist in the presence of Carp even if kept constantly supplied with other food. My previous experience in regard to Carp is that they will let shells of any sort alone if well fed, even *Limnea peregrina* escaping. In one aquarium there are two rather fine Perch with which I have been unable to keep any shell, including even *Paludina contecta*. *Paludestrinae*, however, moved about unmolested. If starved a little the Perch will take this mollusc, but I noticed that the shells appeared again in the excreta unbroken. My later experiments with Roach and Dace go to prove that they will take the shell occasionally if hungry, but do not search for it like the Carp. It seems likely then that the absence of Carp may have a great deal to do with the spread of this shell. But experiments with fish in confinement are by no means conclusive; records should be made of the fish inhabiting the localities where this shell is taken. The young of *Paludina contecta* are unmolested by Carp and Dace, but killed by Perch, Minnow and other fish. It would be interesting to find out which fish allow the *Paludestrina* to breed unmolested, and whether Carp are present in a locality spoken of as "taken over" by this little mollusc.—J. D. DEAN (*Read before the Society*, January 14, 1903).

RARE OR LOCAL IRISH LAND AND FRESHWATER MOLLUSCA.

BY R. WELCH.

(Read before the Society, September 19, 1903).

THE late Mr. William Thompson, of Belfast, in collecting materials for his "Natural History of Ireland," gave keen attention to the distribution of the mollusca, in which he was assisted by a number of friends and correspondents, such as Waller and Humphreys, to whose co-operation he bears testimony repeatedly in vol. 4 of that work. The Waller shells later became the backbone of the Irish collection in the Museum of Science and Art, Dublin.

After Thompson's death little attention seems to have been given to the terrestrial mollusca for well over thirty years, with the notable exception of the work done by the late Prof. Ralph Tate in the north-east, largely in the little glens of the Belfast hills. It was during his only too short residence in Belfast, and while secretary of the local Naturalists' Field Club, of which he was the founder, that his little book on British land and freshwater molluscs was published, in which many of his local finds were recorded. After his departure a few members of our society paid short visits to Ireland—among others, the late Charles Ashford—who recorded *Amphipeplea* from several stations. J. G. Milne worked Achill Island and some districts from Armagh to Bundoran; while that veteran naturalist, Samuel A. Stewart, of the Belfast Field Club, sent many records to Mr. Taylor for the proposed British Census. The results in these cases are recorded in our *Journal*.

In the late eighties our president commenced to work for his list published in the *Irish Naturalist* in 1892, and enlisted a few other workers in various parts of the country. The results of his help and encouragement to, in many cases, isolated workers, may be seen in numerous local lists and short records. This list attracted the attention of well-known conchologists in England, two of whom, E. Collier and R. Standen, have published good local lists for the Ballycastle, Portsalon, Galway, North Clare, and Kenmare districts. In this they had as fellow-workers on various visits Dr. G. W. Chaster, J. R. Hardy, and B. Tomlin, with some Irish workers also.

Steady work year by year, especially since 1895, when the work of five or six members of the Field Club Conference at Galway was published by R. Standen in the *Irish Naturalist*, has greatly aided our knowledge of the distribution of many rare species. *Paludestrina jenkinsi* has been added to the Irish list, and is now recorded from no less than eleven stations, north, south, east, and west, two of these being inland localities, both on Lough Neagh.

Taking now most of the species which are rare or scarce, some of these have such disconnected records as yet that I cannot well group them as having a northern, southern, eastern, or western distribution. In the following notes, however, I give it as far as our present knowledge will allow me to do so.

Taking first those which have a distinctly southern range, the most important is, of course, *Geomalacus maculosus* Allm., long believed to be confined to a small area at Caragh Lake, north-west Kerry. Dr. Scharff, however, found it much further south in the county at Derrynane, and also in Co. Cork, at Glengarriff, while in 1898 I sent to one of our meetings in Manchester good specimens collected for many miles along a roadside south of the Kenmare river. The species is undoubtedly plentiful in that district, and it is a most interesting thing to see it all over lichen-covered rock-surfaces on the bare hill-sides in wet or moist warm weather. The district has the maximum rainfall for Ireland and the most equable temperature. The largest and finest specimens I have seen were collected by Arthur W. Stelfox at an altitude of about 1,000 feet, near the tunnel above Glengarriff, where it must undoubtedly have to endure sharp frosts at times. It is a member of the Lusitanian fauna, and has only been found outside Ireland in north-west Portugal and just over the border in Spain.

The following five species are found only in the extreme south, three of them in one station only and that extremely local. *Hyalinia helvetica* occurs in two localities in Co. Cork; *Helix granulata* in two localities in south-west Kerry, and one near Cork; *Limnæa involuta* in a mountain tarn above the tunnel, Killarney; *Limnæa glabra* recorded many years ago by Thompson¹ from near Cork (this it would be well to have verified); and *Pisidium hibernicum*, a new species found by our president in a lakelet above Glengarriff. *Succinea oblonga*, too, has mainly southern stations, six in the counties of Cork and Kerry alone, though by far the strongest settlement of this species is along the shores of one of the northern lakes, Lough Erne, where it lives in profusion for over half-a-mile at least. This station was discovered in September, 1900, by some English and Irish members of the Society, who were on a collecting expedition in the lake districts of the north-west. The specimens here are high in the spire, and more like those in the Waller collection in the Dublin Museum from Co. Tipperary than the south coast specimens, and Dr. Scharff tells me correspond to the South German *S. arenaria*.

Of the western species which have more than two or three stations, *Hyalinia excavata* is the most interesting. It is more abundant in the south-west than elsewhere, especially in the damp old woods and rocky glens about Upper Killarney, local but moderately plentiful in Clare

and West Mayo, and abundant, Mr. J. N. Milne tells me, in Ray, Kilderry, and Walworth Woods, North-West Donegal. Our president found it recently at an inland station, Tempo Manor, in Co. Fermanagh, all the others being on or fairly near the coast.

Vertigo liljeborgi and *Otina otis* are only found on the west coast. The former, as Messrs. Chaster and Tomlin have pointed out recently in the *Irish Naturalist*,¹ is moderately plentiful near Roundstone, S.W. Galway, but requires careful searching for. *Otina* has now been recorded for four stations, from Miltown-Malbay in Clare, to Rosapenna in N.W. Donegal.

The three *Testacellæ* and *Cæcilianella acicula* have mainly a south-eastern range, though the latter is found very sparingly at one locality on the coast of Clare. Kilkenny, however, seems to be its headquarters, Mr. P. H. Grierson having collected it recently in ten stations in the south-east counties, all on limestone areas.

The species which occur mainly in the eastern counties are *Helix pisana*, abundant, but confined to a narrow strip of sand-hills along the north Dublin, Meath, and south-east Louth coasts; some records further south require verification. *Helix hortensis* is much more plentiful on the eastern margin of the limestone plain than elsewhere, especially Dublin and Meath, though it runs north into three stations in Down, Tyrone, and Donegal, very local and scarce in all three.

Sphærium lacustre is also an eastern species, perhaps more abundant in two north-east stations than elsewhere, but it has two or three outliers in the south-west. Small ponds seem its favourite habitat. It is rarely plentiful.

Hydrobia ventrosa lives in two estuaries on the east coast and two on the west, possibly several others, but *P. jenkinsi* has mainly an eastern distribution, though it is extremely plentiful on the north Derry coast, and also occurs in Clare, Kerry, and Cork.

Three species are confined chiefly to the limestone plain, one of them, *Planorbis corneus*, entirely so, and to a restricted area not far west of Dublin, where, however, it is plentiful. *Clausilia laminata* has now been recorded from five localities, three on the central plain in Cavan and Westmeath, and one each in Fermanagh and Sligo. *Amphipeplea glutinosa* is more abundant in the centre of Ireland than elsewhere, sometimes very plentiful in a small lake near Clonbrock. It is, also, sometimes moderately common but local in the drains off the Bann, near Portadown, in the north-east, where W. Green has collected it in mid-winter from under the ice.

Of northern species, *Vertigo alpestris* is the most marked; it has now been recorded from one locality each on the coast sandhills of Antrim, Derry, and Donegal, always extremely rare. *Helix arbus-*

torum has its head-quarters in the little coast glens of north-east Antrim, where it sometimes swarms all over the nettles and brambles in damp weather. It is also plentiful at Glencar, in north Leitrim, and is recorded from one station each in Derry, Armagh, and Westmeath. A Limerick record seems to me rather doubtful, and I have failed to verify a Killarney one.

Vertigo pusilla has been found in six stations on the north-east and west coasts of Ulster. At three of these it is moderately plentiful in shell pockets in the dunes, at Portstewart, Narin, and Bundoran. It has also been found sparingly in Co. Dublin, north Tipperary, Clare, Limerick, Cork, and Kerry, so that it is fairly generally distributed, but with one exception always on or near the coast.

There is one other species, a few years ago considered extremely local and rare, that I desire to call attention to, as it seems to have been at one time more abundant than at present, though smaller in size—*Planorbis glaber*. This species is plentiful in many localities in shell-marls from under peat-bogs, with *Planorbis crista*, and I have records now from seventeen stations, but none from the south-east corner of Ireland, either living or from marl-deposits. The living specimens from ponds at Belfast Mr. Lionel E. Adams states are the finest he has seen.

Planorbis vortex and *P. carinatus* seem plentiful only along the north-west margin of the central plain. The first seems absent in the north-east, replaced by *P. spirorbis*, and I know of only one north east habitat for really typical *P. carinatus*.

Six species, either strictly maritime, or nearly so in other parts of the country, occur far inland on the central limestone plain. These are *Helix virgata*, *H. intersecta*, *H. ericetorum*, *H. acuta*, *H. pulchella*, and *Pupa muscorum*, the latter very rare as a rule.

Physa acuta Drap. at Kew Gardens.—In my friend, Mr. Pannell's interesting Surrey records, this species is entered to my name in such wise as to make it appear that he supposes me to be its first discoverer at Kew (*J. of Conch.*, vol. 10, p. 333, July 1903). I had no intention of creating such an impression on his mind. The mollusk has been known, evidently in the same tank, for more than forty years. I quote the following from Mr. J. Gwyn Jeffreys ("British Conch.," vol. 1, p. 100, 1862): "Mr. Choules has described in the '*Zoologist*' a species of *Physa*, which he found in a water-tank in Kew Gardens, and which Mr. Norman (being misinformed as to the precise locality) has proposed to admit into our native fauna. It appears to be a variety of the *P. acuta* of Draparnaud, but it is indistinguishable from specimens in the British Museum which were collected in Cuba, St. Thomas, and St. Croix, and it has probably been introduced with some aquatic tropical plant." See also, for recent notices, Mr. Lionel E. Adams ("Collectors' Manual," ed. 2, Introduction, p. 18); and Messrs. Williams, Taylor and Roebuck ("Land and Freshwater Shells," *Young Collectors' Series*, ed. 3, p. 69).—WILLIAM WHITWELL (*Read before the Society*, Sept. 9th, 1903).

PROCEEDINGS OF THE CONCHOLOGICAL SOCIETY OF GREAT BRITAIN & IRELAND.

322nd Meeting, September 9th, 1903.

Mr. Charles Oldham in the Chair.

Donation to the Illustration Fund announced and thanks voted :

Mr. J. Cosmo Melvill, £2.

Donations to the Library announced and thanks voted :

"Mollusca," "Brachiopoda," Zoological Record, vol. 39, by E. R. Sykes and E. A. Smith ; "Malacological Notes," 2 parts ; "Descriptions of new Land Shells from the Austro-Malayan Region," and "*Cerastus dinshawii* from Aden, etc.," by E. R. Sykes ; "Synopsis of the Family Astartidæ," by W. H. Dall (*from the respective authors*), and the usual periodicals received in exchange.

New Member Elected.

A. D. Darbishire, B.A., Zoological Department, Owens College, Manchester.

Candidates Proposed for Membership.

Major E. F. Becher, R.A., 2, Berkeley Villas, Pittville, Cheltenham.

P. B. Nash, 135, Melfort Road, Thornton Heath, Surrey.

Papers Read.

"Description of a New Species of *Modiola* from Malacca," "Note on *Macron trochlea*," by Edgar A. Smith, I.S.O.

"*Physa acuta* Drap. at Kew Gardens," "*Helix cantiana* Montagu at Tooting Common, Surrey," by William Whitwell, F.L.S.

"Note on *Cassia paucirugis* Menke," by Mrs. Agnes F. Kenyon.

"Report on the Miller's Dale Ramble," by J. W. Jackson.

Exhibits :

By Mr. J. T. Wadsworth : *Pupa anglica*, *P. muscorum*, and *P. cylindracea*, Derrynane, County Kerry.

By Mr. E. H. Turner : *Helix cepa*, and a series of small species of *Cypræa*, including many varietal and some abnormal forms.

By the Rev. L. J. Shackelford : *Cerastus dinshawii* Sykes, from Senna ; *Erinna thaamumi* Ancey, Wailuku River, near Hilo, *Succinea inconspicua* Ancey, Kukuihaele, and a series of colour varieties of *S. kuhnsi*, Kaiwika, at an altitude of 2,600 feet, district of Hilo, Hawaii.

By Mrs. A. F. Kenyon : A series of varietal forms of *Cassia paucirugis* Menke to illustrate her paper.

By Mr. J. W. Jackson : *Cæcilioides acicula* and other species taken during the Miller's Dale Ramble.

It was decided to hold the following

Special Exhibits at Future Meetings :

October 14th, 1903	-	-	The Genus <i>Trivia</i> .
November 11th	-	-	British Species of <i>Unio</i> .
December 9th	-	-	British Species of <i>Anodonta</i> .

323rd (Annual) Meeting, September 19th, 1903.

Held at the Rooms of the Royal Irish Academy, Dublin.

Dr. R. F. Scharff, M.R.I.A (President) in the Chair.

Appointment of Auditors.

Messrs. J. W. Jackson and E. C. Stump were re-appointed Auditors.

New Members Elected.

Major E. F. Becher, R.A., 2, Berkeley Villas, Pittville, Cheltenham.
P. B. Nash, 135, Melfort Road, Thornton Heath, Surrey.

Candidates Proposed for Membership.

A. P. Grierson, The Land Commission Office, Dublin.
Hugh McClelland, Bryn, Somerville Road, Sutton Coldfield.
J. N. Milne, Foylemore, St. Jude's Avenue, Belfast.
A. W. Stelfox, Oakleigh, Ormeau Park, Belfast.
Gerald M. Taylor, Rossall School, near Fleetwood.

Annual Report and Balance Sheet.

The Annual Report of the Council (see p. 22), and the Treasurer's Report, including the Balance Sheet for 1902 (see vol. 10, p. 305), and the Interim Balance Sheet (see p. 23), were presented and adopted.

Election of Officers and Council.

The Scrutineers reported that forty valid papers had been received, and that, with the exception of one name on one paper, they were unanimously in favour of the list as nominated by the Council. The Officers and Council enumerated in the list (see p. 2) were therefore declared to be duly elected.

Paper Read.

"Rare or Local Irish Land and Freshwater Mollusca," by R. Welch.

Exhibits.

The President exhibited two of the special collections of land and freshwater mollusca from the National Museum of Ireland, viz., one containing a representative series of the species inhabiting the Atlantic Islands, and another those of the whole Palearctic Region.

The former includes several of Wollaston's type specimens. The greater part of the collection was formed by Wollaston, Lowe, Mousson, Morelet, and Scharff.

The Palearctic Collection contains over three thousand species and varieties, among which are numerous type specimens of Westerlund, Kobelt, Bourguignat, Mousson, Boettger, Kimakovics, Locard, Fagot, Hidalgo and Naegele. The President showed a few of the rarer species of *Helices*, and referred to the names of the principal conchologists who had contributed to the formation of this large collection.

Mr. A. R. Nichols exhibited a few of the more interesting specimens of mollusca that have been dredged in deep water off the western coast of Ireland, viz., a young specimen of *Pecten vitreus* from 214 fathoms, and a valve of *Nuculana frigida* from 345 fathoms; *Dentalium agile*, *Entalina quinquangularis*, and *Cadulus subfusiformis* from 345 fathoms; *Buccinofusus berniciensis* from 500 fathoms; *Cassidaria rugosa* with animal, from 345 fathoms; and *Typhlomangilia nivalis* from 214 fathoms, etc. The following specimens that have been collected in tow-nets off the coast of Kerry were also exhibited, *Carinaria mediterranea*, *Clione limacina*, and *Clio pyramidata*.

Miss Amy Warren sent for exhibition living specimens of *Vertigo angustior* from Killanley, Sligo, and examples of *Donax vittatus* var. *truncata* from Killala Bay.

Dr. G. W. Chaster : Examples of the rarer Irish land and freshwater mollusca.

Mr. Redding : Land and freshwater mollusca from the neighbourhood of Dublin.

Mr. R. Ll. Praeger, B.A., exhibited, with remarks, Marine Shells from the Estuarine Clays of the north of Ireland.

Mr. P. H. Grierson : Species illustrating the Molluscan Fauna of Co. Kilkenny.

Mr. J. de W. Hinch : High-Level Glacial Mollusca from the Dublin Mountains.

Mr. R. Welch showed, in illustration of his paper, Maps of the Distribution of the following species, and the shells themselves in the majority of cases : *Hyalinia*

excavata, *Geomalacus maculosus*, *Helix granulata*, *H. arbustorum*, *H. hortensis*, *H. pisana*, *Vertigo alpestris*, *V. pusilla*, *V. liljeborgi*, *Clausilia laminata*, *Cæcilianella acicula*, *Succinea oblonga*, *Hydrobia jenkinsi*, *H. ventrosa*, *Amphipeplea glutinosa*, *Limnæa glabra*, *L. involuta*, *Planorbis corneus*, *P. glaber*, *Sphærium lacustre*, *Pisidium hibernicum*, *P. globulare*, and *Otina otis*.

Mr. H. L. Orr : Boxes showing various methods of mounting small Mollusca in museums and private collections.

ANNUAL REPORT, 1902-1903.

During the past year ten meetings have been held, from October 25, 1902, to September 9, 1903, inclusive, at which the attendance has been satisfactory.

Thirteen new members have joined the Society ; five resignations—received before the end of 1902—have already taken effect ; three—received later—will take effect at the end of this year. Two members have been struck off the list for non-payment of their subscriptions ; the Society has to regret the loss by death of three subscribers : Mrs. Nutcombe Gould, Mr. J. C. Mansell-Pleydell, and Major-General Linnæus Tripe.

There are at present on the roll 10 honorary members, and 274 ordinary members, of whom 16 are life-members.

Three numbers of the Journal have appeared since the last Annual Meeting, containing eighty-seven pages, six plates, and several other illustrations. The October number of the Journal, to be shortly issued, will complete the tenth volume of the series, and the third which has been published since it was transferred to the Society.

In addition to the Periodicals and Transactions, acquired by exchange for the Journal, Donations to the Library have been received from the Rev. R. Ashington Bullen, from Messrs. Edward Collier, W. H. Dall, G. K. Gude, G. B. Howes, H. Wallis Kew, and E. R. Sykes.

The Library has been greatly enlarged since the last Catalogue was issued in 1891, and the Council has had under consideration the question of publishing a new edition, but before undertaking a work of such magnitude and expense they desire to have an expression of opinion on the matter after full discussion at a representative meeting of the members.

There is a satisfactory demand for the Society's publications. Last year the sum of £6 was received from this source, whilst the present year up-to-date has yielded just over £16. Part of this is from the List of Marine Mollusca, part from the sale of back numbers. The action of the Council in taking over the stock of these from Mr. J. W. Taylor has been fully justified.

The List of Land and Freshwater Mollusca, published by the Society in 1892, is now exhausted, and it has therefore been thought advisable to issue a new one, based on the list drawn up by Mr. B. B. Woodward, and in course of publication in the Journal. Mr. Woodward has, however, been so drastic in his exclusion of varieties that it is thought his list, in its present form, would hardly fulfil the wishes of British collectors ; the Council, therefore, propose to appoint a Committee to insert such as are likely to meet the approval of working members.

The Council has had peculiar satisfaction in accepting the invitation of the President to hold the first meeting on Irish soil, regarding it as a fitting tribute to the energy and enthusiasm displayed by the Irish members in the work of the Society.

Interim Balance Sheet.

The Balance Sheet for the year 1902 has been published in the April number of the *Journal* (see vol. 10, p. 305). Below is given a statement for the current year up

By Mr. J. W. Baldwin : *Jamnia muscorum* m. *sinistrorsum* and other shells, from Abersoch, to illustrate his paper.

By Mr. Edward Collier : Swiss Mollusca, to illustrate his notes.

By Mr. J. D. Dean : A series of Mollusca from the neighbourhood of Lancaster, to illustrate his paper.

By Mr. Thomas Edwards : Some scalariform and deformed examples of *Buccinum undatum*, from the Isle of Thanet.

By Mr. W. Moss : *Hyalinæ*, from Farøe Isles.

By Mrs. J. M. Blundell : A small, globose, yellowish-red variety of *Cypræa arabica* from Mauritius.

A series of *Trivia* were shewn by Messrs. Standen, Jackson and Baldwin. The chief peculiarities of structure and life-history, so far as it is known, of this interesting group of small cowries were pointed out by Mr. Standen. A particularly fine series of *Trivia europæa*, shewing growth stages and local variation, was exhibited.

325th Meeting, November 11th, 1903.

Mr. Charles Oldham in the chair.

Donations to the Library announced and thanks voted :

The usual periodicals received in exchange.

New Member Elected.

Gordon Dalgliesh, Clairval, Collings Road, Guernsey.

Candidates Proposed for Membership.

Miss Gwynedd Scott, West Quarter, Hexham.

J. R. Redding, 173, Clonliffe Road, Dublin.

Resignation.

A. E. Wilson.

Member Deceased.

Isaac C. Thompson, F.L.S.

Resignation of Recorder.

A letter was read from Mr. Lionel E. Adams, explaining that in consequence of his leaving Stafford, and his future movements being uncertain, he had felt it necessary to resign the Recordership. It was announced that Mr. Charles Oldham had, at the request of the Council, undertaken to discharge the duties of the office until the next Annual Meeting.

Papers Read.

"Obituary Notice of the late Isaac Cooke Thompson, F.L.S.," by W. E. Hoyle.

"The Reproduction and Nomenclature of *Paludestrina taylori*," by J. W. Jackson and F. Taylor.

"The Land and Freshwater Mollusca of Grange-over-Sands : Further Observations," by J. W. Jackson and C. H. Moore.

"The Type of *Cypræa caput-anguis*," by L. St. George Byne.

Exhibits.

By Mr. F. Taylor : *Helix acuta*, adult and perfect, taken along with beetle elytræ from stomach of common toad (*Bufo vulgaris*) at Conway, North Wales.

By Mr. A. W. Rymer Roberts : *Pupa anglica*, from near the Ferry Hotel, on the Furness side of Lake Windermere ; *Vertigo antiwertigo*, from a very restricted area near Winster, Westmorland ; *Planorbis contortus* and *P. albus*, from Windermere, and *Velvetia lacustris*, White Cross Bay, Windermere.

Series of British examples of the genus *Unio* were exhibited, including *U. tumidus* of an unusual triangular form, from River Lea, Waltham Abbey, Herts., by Mr. W. J. Hall ; *U. pictorum*, from Canal, at Marple, Cheshire ; a series shewing (a)

specimens with golden nacre and attached pearls; (*b*) a set of small but perfect pearls; (*c*) a series of young shells from earliest stages of growth, by Mr. R. Standen. Specimens of *U. margaritifer*, *U. tumidus*, and *U. pictorum*, from the "Oldham" Collection, were shewn to illustrate locality variation; and a series of very large and ponderous shells, from a pond at Ward End, near Birmingham ("Darbishire" Collection) were interesting as shewing an apparent connection between *U. tumidus* and *U. pictorum*.

326th Meeting, December 9th, 1903.

Mr. Edward Collier (Vice-President) in the chair.

Donations to the Cabinet announced and thanks voted:

By Miss J. E. Linter: *Tornatellina peponum* Gld., *T. macrophala* Ancey, *T. abbreviata* Ancey, Maui, Sandwich Islands.

Donations to the Library announced and thanks voted:

"A short account of the Land and Freshwater Mollusca of Haselmere, Surrey," by Ch. Pannell (*from the author*); *Nachrichtsblatt der Deutschen Malakozoologischen Gesellschaft*, 1889-1903 (*from the Society*); and the usual periodicals received in exchange.

New Members Elected.

Miss Gwynedd Scott, West Quarter, Hexham.

J. R. Redding, 173, Clonliffe Road, Dublin.

Candidates Proposed for Membership.

Fred Booth, 43, Victoria Road, Saltaire, Yorks.

Henry William Parritt, 8, Whitechapel Park, Upper Holloway, London, N.

Resignation.

W. H. Johnson.

Member Deceased.

P. Brooke Mason, J.P., M.R.C.S., F.L.S. (Past President).

Papers Read.

London Branch; Annual Report.

"The Marine Mollusca of Tenby and Neighbourhood: Further Contributions," by J. Williams Vaughan.

"Land and Freshwater Mollusca of Brecon," by J. Williams Vaughan.

"Freshwater Shells of Naples and the Neighbourhood," by Raffaele Bellini.

"Report on the Droylsden Ramble," by Fred Taylor.

"*Succinea oblonga* Drap. var. *alba* n.," by C. E. Wright.

"*Sepia burnupi* n.sp. from Natal," by W. E. Hoyle.

"The Structure and Life-History of *Anodonta cygnea*: a Resumé," by W. J. Hall.

Exhibits.

By Mr. C. E. Wright: *Succinea oblonga* and var. *alba* from Braunton Burrows, near Ilfracombe; *Amphipeplea glutinosa* var. *alba*, Deal, Kent; *Helix hortensis* var. *undulata*, Weekley, Northants; var. *bimarginata*, Rothwell; var. *citrinizonata*, Kettering, Northants; and *H. caperata* var. *ochroleuca*, Tenby.

By Mr. F. F. Laidlaw: Shell and animal of *Volva birostris* L., Cape Patani.

By Mr. A. Leicester: *Testacella scutulum* from garden at New Ferry, Cheshire.

By Mr. R. Standen: *Neptunea antiqua* var. *striata*, dredged in forty fathoms, off Limerick; *Vivipara vivipara*, River Soar, Kegworth, Leicestershire; very large *Unio pictorum*, from German Pool, Poynton; *Limnaea palustris* var. *albida*, from Whittingham, Lancs.; *Gundlachia beddomei* Petterd, Tasmania; *Pompholyx effusa* Lea, Klamath Lake, California; *Lantzia carinata* Jouss., Isle of Bourbon; *Lithotis rupicola*, Bladford, India; and a set of *Melanopsis dufouri* Fér., from Morocco; upon the decorticated apex of the shell an alga has grown, the filaments of which,

by entangling grains of sand and particles of clay, have ultimately formed a large knob, which gives the shells a most singular appearance, and has probably some value as a means of protective concealment. The body whorl of the shells is quite clean, and would appear to have been buried in the sandy mud, the apex alone protruding.

By Mr. C. Oldham : *Anodonta cygnea*, Tatton Mere, Cheshire, showing curious malformation due to injury to mantle at an early stage of growth.

By W. E. Hoyle : *Sepia burnupii*, the type specimens.

On behalf of Mr. F. J. Partridge : *Vitrea rogersi*, Dudley Castle, Worcestershire; *Ancylus fluviatilis*, Innisfallen, Killarney (a new record for Kerry); and a series of North Devon Mollusca, including thirty-eight new county records.

On behalf of Mr. L. E. Adams : *Helix pomatia*, from open downs near Reigate, Surrey, probably gnawed by rats.

In illustration of Mr. Hall's paper, a series of locality sets of *Anodonta cygnea* was exhibited by Messrs. C. Oldham, W. J. Hall, J. W. Baldwin, J. T. Wadsworth, J. W. Jackson, J. W. Vaughan, and R. Standen; the latter also showed mounted sets of *Glochidia* (both dry and in situ upon fins and tail of Stickleback); and young shells in earliest stages of growth after passing the *Glochidia* stage.

It was decided to hold the following

Special Exhibits at future Meetings :

January 13th, 1904	- - -	<i>Dreissensia polymorpha</i> .
February 10th, 1904	- - -	<i>Limnæa palustris</i> .
March 9th, 1904.	- - -	British Pectens.

A Standard of Value for Exchanges.—I think a discussion in the *Journal* would be useful as to some recognized value system for exchanges. Most of our collections are no doubt mainly built up by exchanges, but as a matter of honour and morality we should no more desire to 'do' others than to be 'done' when exchanging. Personally I have often found great generosity amongst brother conchologists, and I trust have been not ungenerous myself either in exchanges or in giving. But I have not infrequently found that would be or actual exchangers offer what practically comes to the equivalent of "Twopence for your half-crown!" To-day, for example, an American conchologist (who shall be nameless because, no doubt, he acts in ignorance of comparative values) sends me two species which I find marked in an American dealer's catalogue (a useful one obtainable from W. F. Webb, Albion, New York) at 20 cents and 5 cents respectively. In exchange he would like certain shells from Asia, which I find priced in another catalogue at from 1s. to 8s. How many from this list of desiderata he wanted me to send I do not know; but as I sent him an *Orthostylus* priced at 4s. in exchange for his specimens which came altogether to the value of 75 cents, I hope he will not be disappointed. Some time ago I drew attention to the disappointment that ensued when in exchanging with continental conchologists one received as distinct species shells hardly worthy of a varietal name and belonging to a very common species. I suppose I have had *H. virgata* sent to me under forty different names, and the same may be said to a somewhat less degree of *H. lucasi*, *H. pisana*, &c. The late Mr. Layard used to feel strongly, and write amusingly, about the desirability of the establishment of some sort of standard value as a basis of exchange, and I think a correspondence in your columns on this point would be useful.—[Rev.] J. W. HORSLEY (*Read before the Society*, May 13, 1903).

SEPIA BURNUPI n.sp. FROM NATAL.

By W. E. HOYLE, D.Sc.

(Read before the Society, Dec. 9, 1903).

PLATE I.

THE *Shell* only is known ; it is very long and narrow, and comparatively thick, and may be roughly likened in shape to a spear-head : the greatest breadth is well in front of the middle, the lateral margins are evenly curved, and the anterior end bluntly pointed. The *chitinous margin* (almost entirely lost) appears to have been very narrow. The *dorsal surface* is smooth, its two lateral thirds being covered by an extension of the chitinous margin ; along the middle line is a raised fillet, about one-fifth as broad as the shell ; in the young shells it becomes evanescent in the posterior third, but in the larger specimens continues till interrupted by the breaking of the shell. The *ventral surface* is strongly convex, except for a narrow groove down the centre, which is more pronounced in the young shells ; the *last loculus* has an index of about thirty-four in the larger shells and forty-six in the smaller ; the *striated area* is convex except for the median groove above mentioned, hence the thickness of the shell ; the *inner cone* is but feebly developed, its two limbs are narrow chitinous fillets, which simply curve round the striated area, forming no definite conical depression ; on the other hand, the *outer cone*, formed by a posterior expansion of the chitinous margin, is large and well developed ; the *spine* is conical, acute, and curves very slightly towards the dorsal surface.

DIMENSIONS.

Register number	188	189	190	191
	—	(broken anteriorly)	(broken)	(broken)
	mm.	mm.	mm.	mm.
Length	- 49	45	117	112
Breadth	- 9.75	8	19	20

The above measurements can only be taken as approximate, as the specimens are all somewhat damaged.

The species above described is based on an examination of five shells, numbered in my register 188-192 ; they were obtained as follows :—

- 188 } Umkomaas, Natal, collected by Mr. Burnup, numbered by him
- 189 } 1943, and sent to me by Mr. J. H. Ponsonby.
- 190 } Port Elizabeth, Natal ; given to the British Museum by Mr.
- 191 } H. A. Spencer, and registered 90-12-14-42, 43, 44. I am
- 192 } indebted to Mr. E. A. Smith for the opportunity of examining these specimens.

The new species is very similar in general to *S. capensis*,¹ but is much longer and narrower, and lacks the well-developed internal cone. As compared with *S. elongata*² it is broader and thinner, but resembles it in the development of the outer cone. It is to be hoped that Mr. Burnup may be fortunate enough to procure complete examples of this interesting form.



Some Results of a Flood in North Ireland.—"Tis an ill wind that blows nobody good" is a trite saying, and the hurricane on the morning of February 27th last that left a zone of devastation across Ireland and England, in breaking through the embankments that guard from the sea large areas of reclaimed land in North Derry, let the flood waters of the Burnfoot River into one intake. With this flood came large masses of fine vegetable débris swept from the banks of the river and this with the débris, many tons in weight, from the flooded area, over a mile square, was stranded on the inner slopes of the embankment between the inner and outer breaks and at the mouth of the river also, where it covered an area of over 200 square feet. Feeling sure this would have small land shells in it, I examined it at once and finding plenty of *Hyalinia crystallina* and *Helix pulchella* on the surface I soon had a large bag full of the wet mass draining off. Bringing this home I turned it into a large tub of fresh water to get rid of the salt, for the sea had also broken into the intake after the river-water had softened the inner slopes. On pressing a wire sieve on the mass the finer part came to the surface and was skimmed off, and this operation was repeated till most of the portion containing the small shells had floated through. This I found a very much quicker way than the usual one of drying all the mass, as the remainder could now be washed through the sieve under the tap and all the finer part drained in a gauze sieve and dried; this I do on old thick photo-blotting boards. When dry I sifted a little of it into several grades and examined for shells, the following species being present. I have pleasure in sending the remainder not examined for distribution among those members who care to look through it. The farms are submerged at high tide from two to about eight feet, and great masses of the débris are all over the embankment and likely to be available for collectors for months to come. List of species:—

Vitrina pellucida (some alive)

Hyalinia cellaria

H. alliaria and var. *viridula*

H. crystallina

Helix pygmaea

H. pulchella (very plentiful)

H. hispida

H. intersecta (= *capitata*)

H. nemoralis

H. aspersa

H. rotundata

Cochlicopa lubrica

Pupa cylindracea

P. muscorum

Vertigo pygmaea

V. substriata

V. antivertigo

Carychium minimum

Alexia denticulata

Planorbis spirorbis

Paludestrina jenkinsi

P. ulva

Pisidium sp. ?

R. WELCH (Read before the Society, March 11, 1903).

¹ Férussac & d'Orbigny, "Céphalopodes acétabulifères," Seiches, pl. 7, 1835-48.

² *Op. cit.*, pl. 24, fig. 7-10.

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"Mollusks occurring in Southern California," by R. E. C. STEARNS [several species introduced]. "Descriptions of new Japanese Land Shells," by H. A. PILSBRY and Y. HIRASE [*Chloritis tosanus*, *Eulota cavitectum*, *Arinia japonica*, nn.spp.]. "Illustrations of some Japanese Land Shells" [given in plate accompanying Hirase's catalogue]. "Habits of *Acanthopleura granulata*," by S. H. HAMILTON [dorsal eyes enable it to see the coming waves]. "Temple Prime" [obituary notice] by S. RAYMOND ROBERTS. "*Conus prometheus* Hwass [*C. nicholii* Wilson a synonym]. "*Miodontiscus* n.n. for *Miodon*," by W. H. DALL.

"Montana Shells—*Pyramidula strigosa*," by MORTON J. ELROD [vars. enumerated and described]. "Writings of Jas. G. Cooper on Conchology and Palæontology," by W. J. RAYMOND [catalogue of writings with lists of species described].

"Notes on Eastern American *Ancylus*," by B. WALKER [catalogue with descriptions and figures]. "Two new species of Eocene. Fossils from the Lignitic of Alabama," by T. H. ALDRICH [*Umbraculum elevatum*, *Gastrochaena striata* figd.]. "New Pisidia," by V. STERKI [*P. ohioense*, *P. mainense*]. "A proposed study of *Goniobasis*," by A. C. BILLUPS [suggestions for a monograph].

"Notes on Eastern American *Ancylus*," by B. WALKER. "Descriptions of new Japanese Land Shells," by H. A. PILSBRY and Y. HIRASE [*Japonia sadoensis*, *Chloritis tosanus*, *Kaliella xenica*]. "A proposed Study of *Goniobasis*," by A. A. HINCKLEY [comments on Billups' paper supra]. "Descriptions of new Achatinellidae from the Hawaiian Islands," by D. D. BALDWIN [*Amastra henshawi*, *A. saxicola*, *A. senilis*, *A. fossilis*, nn.spp.]. "A new *Pleurotomaria*" [*P. hirasei*, Japan], by H. A. PILSBRY. "Death of two New Caledonian Conchologists, Richard Rossiter and Julien Bernier."

"Two new Mollusks from the West Coast of America," by W. H. DALL [*Sigaretus noyesii*, *Tonicia arnheimi*]. "Pleistocene Mollusks of White Pond, New Jersey," by F. C. BAKER [13 spp. enumerated]. "On Cataloguing a Collection of Shells," by Mrs. M. B. WILLIAMSON [practical suggestions]. "New North American Pisidia," by V. STERKI [*P. ashmuni*, *P. danieli*, nn.spp.]. "Notices of new Japanese Land Shells," by H. A. PILSBRY and Y. HIRASE [*Eulota euterpe*, *E. marginata*, *E. conomphala*, *Hirasea planulata*, *Kaliella incensa*, nn.spp.]. "Obituary notice of George T. Marston." "Land Shells of Curaçao," by H. A. PILSBRY [*Cionella gloynii*, *Succinea gyrata*, omitted from Smith's catalogue].

"The specific value of *Unio declivis* Say," by L. S. FRIERSON [a good species, figured]. "A new species of *Metzgeria* [*M. californica*]," by W. H. DALL. "New Land Shells of the Japanese Empire," by H. A. PILSBRY and Y. HIRASE [*Eulota* 5 nn.varr., *Tornatellina kitaiovojimana*, *Kaliella nesiotica*, *Sitala nijimana* nn.spp.]. "Note on the family Septidae," by W. H. DALL [defence of generic name *Septa*]. "On some new Land Mollusca from Middle America," by C. F. ANCEY [*Streptostyla sumichrasti*, *S. clavulata*, nn.spp.]. "A partial list of the Marine Mollusks of San Salvador, Bahamas," by F. C. BAKER. [29 spp. enumerated].

"A new genus of Trochidae," by W. H. DALL [*Stylobates æneus*, n.g., n.sp., off Hawaiian Islands]. "Distribution of Jamaican species of *Colobostylus*," by P. W. JARVIS [with maps]. "A new Jamaican *Colobostylus* [*C. nuttii*]," by H. A. PILSBRY. "Notes on the Mollusk Fauna of San Nicholas Island," by H. N. LOWE [list of 26 forms]. "New Japanese Marine Mollusks," by H. A. PILSBRY [*Phasiarella tristis*, *Gibbula vittata*, *G. incarnata*, *Monilea nucleolus*, nn.spp.]. "Large fresh-water Pearl."

"Some notes on the genus *Fulgur*," by C. W. JOHNSON [distribution and evolution]. "The greatest American *Planorbis*," by H. A. PILSBRY [*P. magnificus*, 36 mm. in diameter]. "Observations on the Byssus of Unionidæ," by L. S. FRIERSON. "A new *Guppya* [*G. miamiensis*] from Florida," by H. A. PILSBRY. "New Land Snails of the Japanese Empire," by H. A. PILSBRY and Y. HIRASE [*Genesella moellendorffiana*, *Pristiloma japonica*]. "New Pisidia," by V. STERKI [*P. complanatum*, *P. rowelli*, *P. cuneiforme*]. "New Land Snails from South America," by C. F. ANCEY [*Epiphragmophora orophila*, *E. turtoni*, *Porphyrobaphe sarcostoma*]. "Shells of Douglas Co., Central Washington," by H. A. PILSBRY [list of 12 forms]. "*Schismope rinuloides* (Cpr.) at San Diego," by H. A. PILSBRY.

Journal de Conchyliologie, vol. 50, no. 4 ; vol. 51, nos. 1, 2, 1902-1903.

"Note sur quelques espèces du genre *Pecten*, nouvelles ou mal connues," by A. BAVAY [*P. vescoi*, *P. coudeini*, nn.spp., *P. elegantissimus*, *P. mundus*, figd.]. "Description d'une espèce nouvelle du genre *Marginella*" [*M. fischeri*, figd.], by A. BAVAY. "Description d'un *Oliva* [*O. rubrolabiata*, figd.], nouveau provenant des Nouvelles Hébrides," by H. FISCHER. "Critical Notes on Hervier's Monograph of the Columbelloidæ of New Caledonia, with *C. hervieri*, nom. nov.," by S. PACE. "Une grande *Venus* [*V. fallax* Millet] du miocène supérieur de l'Anjou," by G. F. DOLLFUS.

"Contribution à la faune malacologique terrestre et d'eau douce des îles Obi et Iolo," by PH. DAUTZENBERG [list of spp., 14 described with figs., 5 nn.spp.]. "Sur les variétés du *Cerithium zebrum* Kiener," by L. VIGNAL [17 characterised and figd.]. "Variété nouvelle de *Cypræa* [*C. asellus* v. *bitaniata*] provenant de la Nouvelle Calédonie," by P. GERET. "Liste de coquilles recueillies au Val-André (Côtes du Nord)," by M. LAVEZZARI. "Sur le genre *Bauxia*," by M. A. CAZIOT [3 spp. with synonymy]. "Nouvelles remarques sur les faunes Australes du globe," by C. F. ANCEY. "Variétés. Les Sociétés Malacologiques (*suite*); la Société Malacologique de France (*fin*)" [abstract of publications].

"Faune Malacologique terrestre de l'Île des Cocos dans l'Océan Pacifique," by C. F. ANCEY [6 spp., none new]. "Faune pliocénique de Karikal (Inde Française)," by M. COSSMANN [31 nn.spp., mostly figd.].

Journal of Malacology, vol. 10, nos. 1-3, Mar.—Oct., 1903.

"Malacological Notes," by E. R. SYKES [*Plicaxis* n.n. for *Rhodina*; *Leptachatina henshawi*, n.sp., figd.; *Eucataulus* Kobelt unnecessary]. "Supposed new species of *Helicina* and *Bulimulus* from Costa Rica," by H. B. PRESTON [*H. gemma*, *B. nubilis*, figd.]. "A classified list of the Helicoid Land Shells of Asia," part 5, by G. K. GUDE. "On some species of Slugs collected by Mr. Fruhstorfer," by W. E. COLLINGE [5 spp. figd., none new]. "Notes on Slugs and Slug-like Molluscs," by W. E. COLLINGE [*Limax umbrosus* Phil. not a synonym of *L. flavus*; *Microparmarion* introduced from Borneo to Kew].

"A Revision of the Columbelloidæ of the Persian Gulf and North Arabian Sea, with description of *C. calliope* n.sp.," by J. COSMO MELVILL. "The Anatomy of certain species of *Ceratisolen* and *Solecurtus*," by H. H. BLOOMER [*C. legumen*, *S. strigillatus*, *S. candidus*, with figs.]. "Classification of the British species of the genus *Solen* Linné," by H. H. BLOOMER. "On the Origin and Function of the Fourth Aperture," by H. H. BLOOMER [an accessory food-providing organ]. "A classified list of the Helicoid Land Shells of Asia," part 6, by G. K. GUDE [*Dyakia smithiana*, *Chloritis tabularis*, *Helicostyla talautana*, nn.spp., figd.]. "On a new genus and species of the family Phenacohelicoïdæ," by H. SUTER [*Ranfuryla constanceæ*, Auckland Island, figd.]. "Description of new Land Shells from the Austro-Malayan Region," by E. R. SYKES [*Xesta sulcatula*, *Planispira albopicta*, *Papuina callosa*, *P. wallaceana*, *P. pyrgus*, *Leptopoma diplochilus*, *L. lamellatum*, *Palaina ponsonbyi*, *Omphalotropis waigiuensis*, *Helicina varians*].

"Descriptions of new species of *Nassa*, *Purpura*, *Latirus*, *Voluta*, *Conus*, *Stomatella*, etc.," by G. B. SOWERBY [*N. optima*, *P. eudeli*, *L. singularis*, *V. dohrni*, *V. planicostata*, *C. boubeeæ*, *S. exquisita*, *Spondylus occidentis*, *S. reesianus*, nn.spp., figd.]. "Notes on, with illustrations of, Austro-Malayan Land Shells," by E. R. SYKES [figs. of spp. previously described]. "Contributions to a Knowledge of the Mollusca of Borneo," part 1, by W. E. COLLINGE [*Damayantia simrothi*, *D. rugosa*, *Collingea eranna*, *Parmarion shelfordi*, *Atopus shelfordi*, nn.spp. figd.]. "A classified list of the Helicoid Land Shells of Asia," part 7, by G. K. GUDE. "Figures and descriptions of supposed new species and varieties of *Ennea*, *Macrochlamys*, *Cochlostyla*, *Strophocheilus* (*Borus*), *Odontostomus* (*Moricandia*), *Leptopoma*, *Cataulus*, *Coptocheilus*, and *Tropidophora*," by H. FULTON [*E. oleacea*, *C. delicata*, *S. separabilis*, *O. toleratus*, *L. placidum*, *L. albicans*, *Cataulus connectens*, *Coptocheilus perakensis*, *T. perfecta*, *T. plurilirata*, nn.spp., figd.]. "On the name *Lima elliptica*," by E. R. SYKES [preocc. *Lima gwyni* n.n. suggested]. "Note on a malformed specimen of *Cerastisolen legumen* L.," by H. H. BLOOMER.

The Naturalist, nos. 555-563, April-Dec., 1903.

"*Testacella scutulum* in North Lincolnshire," by the Rev. E. A. WOODRUFFE-PEACOCK. "Yorkshire *Fusi*," by the Rev. W. C. HEY. "Snails on Roof of Bridlington Priory Tower," by E. P. BLACKBURN [*Hygromia hispida*]. "*Amphipeplea glutinosa* at Tetney, Lincolnshire," by H. WALLIS KEW. "*Sphærium corneum* on the Toes of Toads," by H. WALLIS KEW. "Mollusca at Caistor, Lincolnshire," by C. S. CARTER [list of 34 spp.]. "Mollusca at Grantham," by the Rev. E. A. WOODRUFFE PEACOCK [list of 14 spp. out of 67 taken]. "Nest and Eggs of *Limax flavus*," by W. DENISON ROEBUCK [in earth in a plant-basket, Leeds]. "*Limax cinereo-niger* at Careby, Lincolnshire," by the Rev. E. A. WOODRUFFE PEACOCK. "Note on a Two-Banded Shell of *Helicigona arbustorum* from Wensleydale," by H. WALLIS KEW [v. *bifasciata* n.]. "Snails and Spiders on Towers," by H. WALLIS KEW. "Shore-Collecting near Scarborough and Filey," by the Rev. W. C. HEY. "Mollusca at Huttoft Bank, Lincolnshire," by C. S. CARTER [10 spp. recorded]. "*Arion ater* v. *alba* L., in North Lancashire," by S. L. PETTY.

Journal of Applied Microscopy and Laboratory Methods, vol. 6, nos. 4-6, April and June, 1903.

"A new agent for use in Tide-Pool Collecting," by F. M. CHAMBERLAIN [copper sulphate]. "Hints on Collecting Land and Freshwater Mollusca," by BRYANT WALKER.

La Feuille des Jeunes Naturalistes, nos. 394-398, Aug.-Dec., 1903.

"Question sur le croisement d'animaux de races différentes," by A. DE ZULUETA. "Etude sur quelques coquilles de la région Circa-Méditerranéenne, établie avec le concours de M. Fayot," by Commandant CAZIOT [*Helix*, 3 spp., none new]. "*Helix niciensis* (note complémentaire)," by Commandment CAZIOT [several varr. characterised].

The Irish Naturalist, vol. 12, nos. 4 and 5, April and May, 1903.

"A [new Irish *Vertigo*," by BROCKTON TOMLIN [v. *heldi*]. "Notes on the Mollusca of Co. Kilkenny," by P. H. GRIERSON [list of species with counties where found]. "Some Irish Nudibranch Molluscs" [6 spp. *Doris beaumonti* n.sp.].

Proceedings of the Academy of Natural Sciences of Philadelphia, vols. 54 and 55, 1902 and 1903.

"New Land Mollusca from Idaho," by H. A. PILSBRY [*Pristiloma idahoense*]. "Synopsis of the Carditacea and of the American species," by W. H. DALL [genera *Cardita*, *Venericardia*, *Calyptogena*, *Thecalia*, *Milneria*, *Erycinella*, *Condylocardia* recognised, list of spp., 5 nn.]. "Mollusca of Western Arkansas and adjacent

States, with a Revision of *Paravitrea*," by H. A. PILSBRY [list of spp., several new; *Paravitrea*, 10 forms characterised, with key for determination, 3 plates]. "Notes on the Conrad Collection of Vicksburg Fossils, with descriptions of new species," by T. L. CASEY [many nn.spp., *Phandella*, *Microdrillia*, *Cochlospirella*, nn.genn.]. "Additions to the Japanese Land Snail Fauna," by H. A. PILSBRY [*Clausilia*, 6 nn.spp., figd.].

"Monograph of the Land and Freshwater Mollusca of the British Isles," part 9, by J. W. TAYLOR.

This instalment contains accounts of *Limax cinereo-niger*, *L. tenellus*, *L. flavus*, *L. arborum*, and *Aeriolimax agrestis* in the elaborate style to which previous parts have accustomed the reader.

Transactions of the Royal Society of South Australia, vol. 26, part 2, Dec., 1902.

"Descriptions of new species of Mollusca from the Miocene Limestone near Edithburg," by H. BASEDOW [5 nn.spp., figd.].

Memoirs of the Royal Society of South Australia, vol. 2, part 1, 1902.

"The Cretaceous Mollusca of South Australia and the Northern Territory," by R. ETHERIDGE, Junr. [several nn. spp. figd.].

Memoirs of the Manchester Literary and Philosophical Society, vol. 47, part 3, April 23rd, 1903.

"Notes on the type specimen of *Loligo eblanæ* Ball," by W. E. HOYLE [*Todaropsis eblanæ* of which *T. veranyi* is a synonym].

Arkiv för Zoologi utgivet af K. Svenska Vetenskaps-Akademien, vol. 1, parts 1 and 2.

"On the adaptations to a Molluscivorous Diet in *Varanus niloticus*," by E. LÖNNBERG [alteration in form of teeth due to change of food].

"A Short Account of the Land and Freshwater Mollusca of Haselmere, Surrey," by C. PANNELL (*Haslemere Micros. and N.H. Soc.*, Science Paper, no. 2) [an annotated list of the mollusca of the district].

Proceedings of the Royal Society of Victoria, vol. 16 (n.s.) part 1, Sep. 1903.

"Geology of the Valley of the Lower Mitchell River," by J. DENNANT and D. CLARK [list of fossils]. "On some Australian Tertiary Pleurotomarias," by G. B. PRITCHARD [*P. bassi* n.sp.; list of Tertiary forms, pl. 13, 14]. "On some new species of Victorian Mollusca," no. 6, by G. B. PRITCHARD and J. H. GATLIFF [*Zenatia victoriae*, *Modiola victoriae*, nn.spp., figd.]. "Catalogue of the Marine Shells of Victoria," part 7, by G. B. PRITCHARD and J. H. GATLIFF [97 spp. bivalves of families Castrochænidæ to Lucinidæ].

Proceedings of the American Philosophical Society, vol. 42, no. 173, April-May, 1903.

"A new Freshwater Molluscan Faunule from the Cretaceous of Montana," by TIMOTHY W. STANTON [several new species figd.]. "On some names (chiefly Linnean) of animals and plants erroneously paired in synonymy," by Marchese A. DI GREGORIO [in favour of retention of Linnean specific name even when it repeats the generic name].

The Annals of Scottish Natural History, nos. 46-48, April-Oct., 1903.

"*Helix lamellata* Jeff., in Midlothian, and *Planorbis spirorbis* Müll., in Fife," by W. EVANS. "*Vertigo pygmæa*, etc., in Mid-Perth," by ROBERT GODFREY.

"Synopsis of the family Astartidæ, with a Review of the American species," by W. H. DALL (*Proc. U. S. Nat. Mus.*, vol. 26, pp. 933-951, pl. 62, 63). [*A. polaris*, *A. alaskensis*, *A. bennetti*, *A. soror*, *A. liozona*, *A. vernicosa*, nn.spp., two genera, *Lirodiscus* and *Astarte* recognised].

PLATE I.

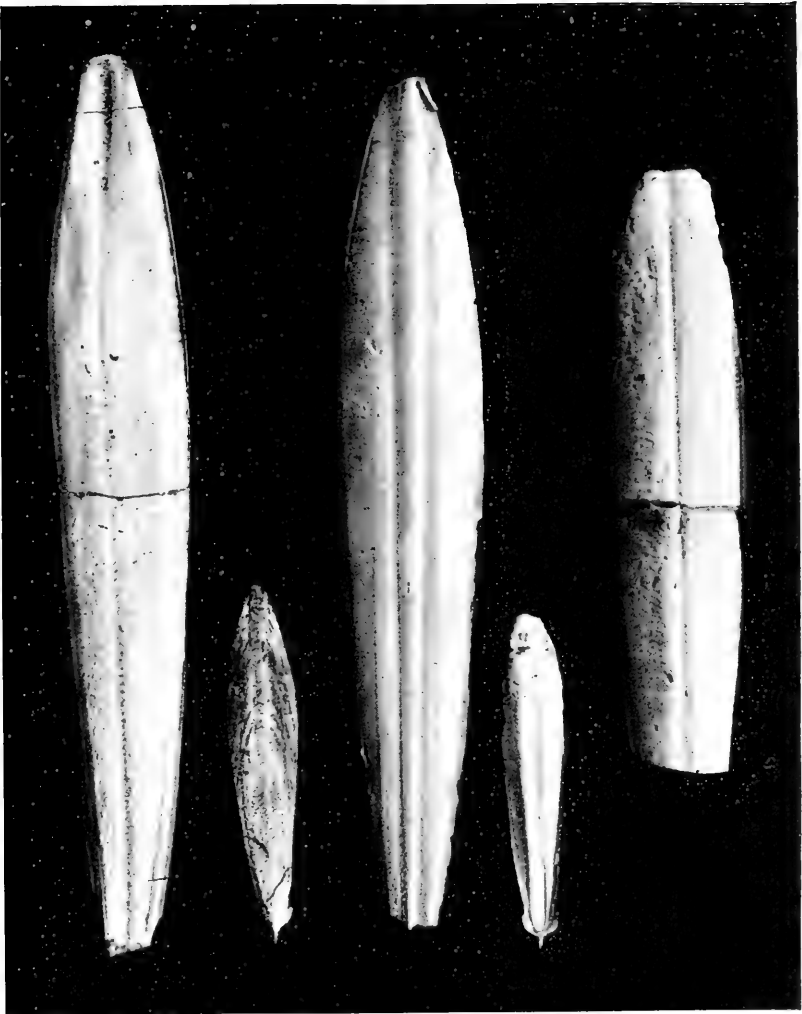
SEPIA BURNUPI, n.sp.

188 }
189 } From Umkomaas, Natal.

Collected by Mr. Burnup.

190 }
191 }
192 } From Port Elizabeth, Natal.

Presented to the British Museum
by Mr. H. A. Spencer.



190

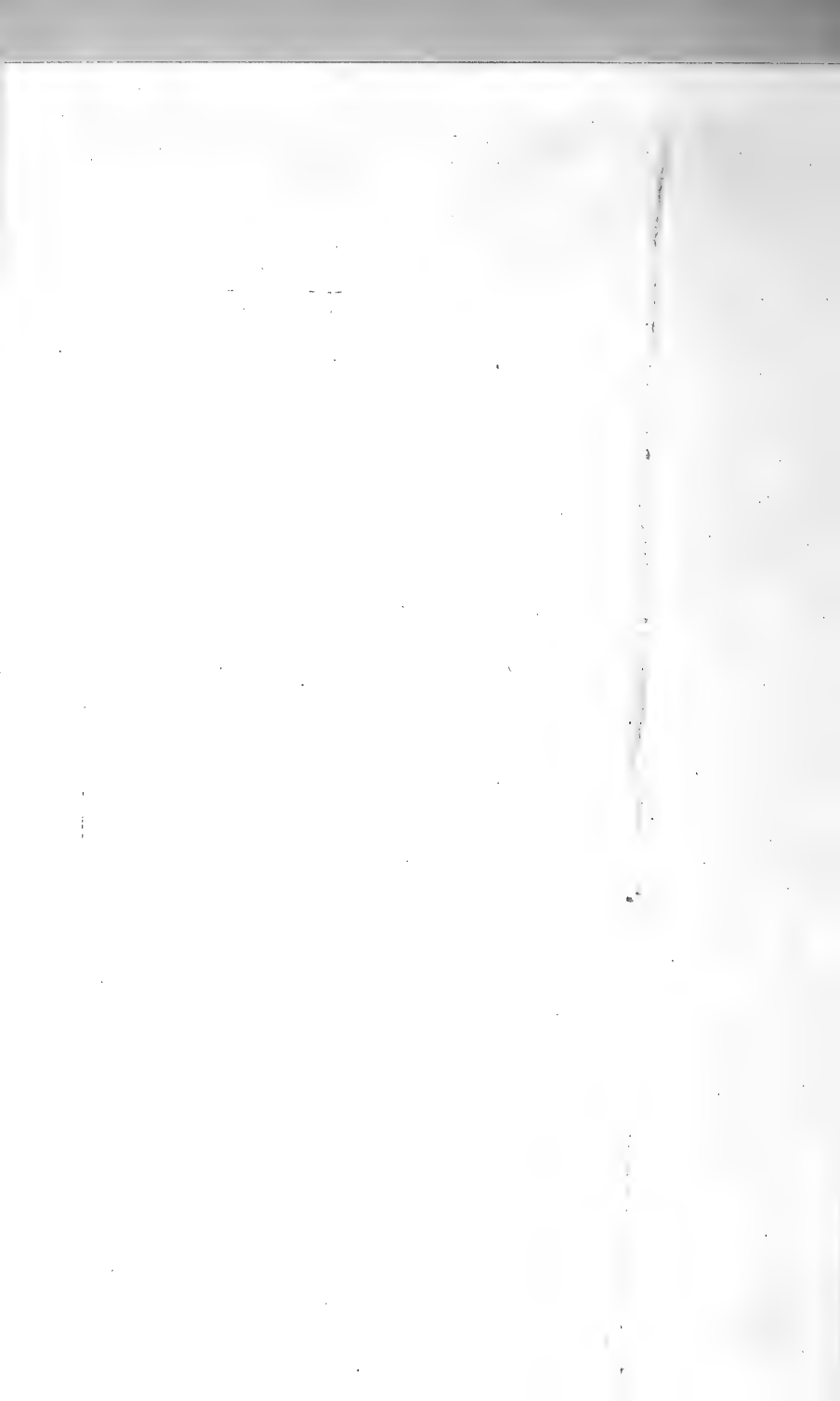
188

191

189

192

SEPIA BURNUPI, NATAL.



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No. 2.

THE FRESHWATER SHELLS OF NAPLES AND THE
NEIGHBOURHOOD.

BY DR. RAFFAELLO BELLINI.

(Read before the Society, December 9th, 1903).

INFORMATION regarding this important and rich section of the local fauna has hitherto been grouped with that concerning the land shells; therefore, so far as we know, there exists no monograph on the subject, and the works in which the freshwater shells of Campania are described have hardly a historical value. Except for the information derived from the work of Philippi¹ and Costa² in the first half of the last century, we have no particulars respecting the shells which abound in the springs and stagnant waters near Naples. This information, moreover, incomplete when published, has now but slight value, as some species have since been excluded and others added; further, habitats have been changed and nomenclature modified.

Costa in his "Catalogo dei testacei delle due Sicilie" gives a list of the authors who have dealt with this subject, obviously, however, derived from a different source from the list in his "Fauna del Regno di Napoli." Philippi's classical work is therefore at present the best authority upon the subject.

¹ "Enumeratio molluscorum Siciliae," 2 vol., 1836-1844.

² "Catalogo dei testacei delle due Sicilie," Napoli, 1829; "Fauna del Regno di Napoli," Napoli, 1839.

The present paper is the result of some years of enquiry. I have had the good fortune to be able to inspect Costa's collection, and also various specimens determined by Philippi himself, as well as my own collection, whilst those of Cavaliere Praus and of my friend the late Baron Castriota-Scanderbeg, rich in forms determined by Philippi, Tiberi, Blanc and Monterosato, have provided me with valuable materials for study.

The greater number of species and individuals are found in the volcanic regions of Vesuvius and the Phlegrean fields, which extend to the edge of the Sorrentine calcareous ridge, and are rich both in streams and stagnant waters. The Sorrentine peninsula, which boasts little level land and consequently little water, is poor in freshwater specimens, but owing to the composition of the earth, abounds in land shells.¹

Naples and the surrounding district are watered by the Sebeto and Sarno rivers. The first, known also as the Rio della Maddalena, rises in Bolla, near Vesuvius, and crosses the marshes north-west of Nola, where it divides into rivulets and irrigation channels, and finds its outlet in the Bay of Naples, near the Ponte della Maddalena. This little river separates the Vesuvian or basaltic from the Phlegrean or trachytic region. The Sarno is formed by the union of three streams at the east of San Severino (Salerno), flows from east to west, and discharges into the Gulf of Naples north of Castellamare and south of Torre Annunziata.

Stagnant waters where freshwater shells may be collected are the Lago di Patria, at the end of the Phlegrean fields, the little lake of Astroni, at the bottom of the crater of the same name, the fountains of the royal park of Capodimonte, of the Villa Nazionale and Botanical Garden in Naples, and a few places in the Sorrentine peninsula and in Capri.

In all twenty-five species of freshwater shells, with numerous varieties, are found in this region; in the calcareous district there are only three species.

In enumerating these species I have adopted a mean between two extreme positions: that which differentiates every recognisable variety as a species, and the other which groups the forms under certain designations. A species is not an invariable quantity, and consequently, in the sense used by Linnæus and Lamarck, no longer exists, but there are many types with decisive characters, and not very clearly related to surrounding forms. It is questionable whether we ought to

¹ R. Bellini, "Molluschi extramarini dell'isola di Capri," *Boll. Soc. Zool. Ital.* vol. 1, 1900; "Alcune osservazioni sulla distribuz. ipsometrica dei molluschi terrestri nell'isola di Capri," *Rendiconto del Convegno in Napoli dell'Unione Zoolog. Italiana*, 10-13 Aprile, 1901.

give all these forms distinguishing names, for if, on the one hand, an elaborate system of classification provides material for a new Linnæus, on the other hand—*nomina si nescis perit et cognito rerum*. We must, therefore, admit a large number of varieties, derived sometimes from an unknown type, and bound together by transitional forms which seem at present to follow no definite law.

The freshwater shells of Naples may be divided into the following faunulæ:—

(1) **Faunula fluviatilis**, comprising the forms inhabiting clear rapid streams (Sebeto, Sarno). Here *Limnæa* and *Planorbis* are absent, but the following may be taken:

<i>Ancylus fluviatilis</i>	<i>Unio requieni</i>
<i>Bithynia tentaculata</i>	<i>Sphærium corneum</i>
<i>Valvata piscinalis</i>	<i>Pisidium casertanum</i>
<i>Neritina fluviatilis</i>	<i>P. amnicum</i>

(2) **Faunula lacustris**, poor in species (Astroni and Lake Patria); the following occur:

<i>Limnæa stagnalis</i>	<i>Physa contorta</i>
<i>L. palustris</i>	<i>Bithynia tentaculata</i>
<i>L. limosa</i>	<i>B. rubens</i>
<i>L. peregra</i>	<i>Valvata piscinalis</i>
<i>Planorbis complanatus</i>	<i>Pisidium casertanum</i>

(3) **Faunula palustris**, including two kinds of ground, which may be termed the "station of plants" and the "station of swamps." It is rich in species and comprises the marshes and the channels of the Sebeto:

<i>Limnæa stagnalis</i>	<i>Physa hypnorum</i>
<i>L. palustris</i>	<i>Bithynia tentaculata</i>
<i>L. truncatula</i>	<i>B. boissieri</i>
<i>L. auricularia</i>	<i>B. rubens</i>
<i>L. limosa</i>	<i>Valvata piscinalis</i>
<i>L. peregra</i>	<i>Sphærium corneum</i>
<i>Planorbis complanatus</i>	<i>Pisidium pusillum</i>
<i>P. carinatus</i>	<i>P. casertanum</i>
<i>P. subangulatus</i>	<i>P. amnicum</i>

(4) **Faunula fontana**, inhabiting still clear waters (Fountains of Capodimonte, the Villa Nazionale and the Botanic Garden):

<i>Limnæa palustris</i>	<i>Pseudamnicola macrostoma</i>
<i>L. auricularia</i>	<i>Bithynia tentaculata</i>
<i>Planorbis fontanus</i>	<i>B. boissieri</i>
<i>P. complanatus</i>	<i>B. rubens</i>
<i>Physa fontinalis</i>	<i>Pisidium pusillum</i>
<i>P. hypnorum</i>	

(5) **Faunula limphana**, comprising certain springs in the Sorrentine Peninsula and Capri:

Ancylus fluviatilis

Limnæa truncatula

Pseudamnicola macrostoma

All the freshwater shells of Naples originated in the tertiary period and have undergone progressive development from the inferior pliocene to present times; more than a third were already differentiated in the pleistocene, but the varieties are all more recent. The following genera originated in the jurassic period:—*Planorbis* (in the lias vide Sandberger), *Physa*, *Limnæa*, *Neritina* (one of the oldest; *N. liasina* Dunker, occurs in the *Schlotheimia angulata* beds of Württemberg, and the species became more abundant in the upper eocene), *Pseudamnicola*, *Valvata*, *Unio*. Of cretaceous origin are *Bithynia* (*B. præcursor* Sandb., is the earliest from the cretaceous rocks of Hanover), *Sphærium* (English wealden). The following are tertiary:—*Ancylus* (eocene), *Pisidium* (inferior eocene of Paris), *Anodonta* (inferior miocene of Germany).

Of the species the least abundant are those of pliocene origin. This fact agrees with all geological principles, because few species have been able to endure the climatic changes that took place in this and later periods. Our fauna belongs to the same type as that of Central Europe; which took its rise in the Alpine regions; the species that constituted that primitive fauna gave rise to others which have varied more or less according to their distance from the centre of dispersion.

The geographical distribution of the Neapolitan freshwater shells is very extensive because the dispersal of these organisms is in direct relation to their size. Our fluviatile mollusca have originated in the zone called Bourguignat¹ "de création," or better, by Locard² "d'apparition." This zone lies between 25° and 36° N. lat., and coincides with a series of mountain chains stretching from the Atlantic to the Caspian. We may seek the origin of our species in the Alpine centre, one of three parts into which the zone is divided.

GASTROPODA.

PULMONATA.

LIMNÆIDÆ.

(1) ***Ancylus* (*Ancylastrum*) *fluviatilis* Müller.**—"Verm. Hist.," II., p. 201, nr. 386, 1774; Drap., "Tabl. Moll.," 1801, p. 47; Phil., "Moll. Sic.," I., 1836, p. 120; II., 1844, p. 93. In colonies in clear and running waters on stones (Sebeto, Monte S. Angelo, Castellammare, Sorrento and Meta).

¹ "Malacologie de l'Algérie," 1864, vol. 2, p. 366.

² "Études sur les variations malacologiques de la faune du bassin du Rhône," II., p. 241.

Var. **margaritacea** A. Costa.—“Statist. fisica dell’isola di Capri,” 1840, p. 65; Bellini, “I moll. extramar, dell’isola di Capri,” 1900, p. 52. Very rare variety, in a fountain called “marroncella” (Capri). We may consider this form as a local modification of the type, from which it differs in the sinuosity of the anterior margin, while the shell is internally pearly. The author thinks *A. margaritacea* to be allied to *A. sinuatus* Brard, a synonym of *A. simplex*, a variety of *A. fluviatilis*.

Bourguignat¹ admits in Europe 35 species of *Ancylus*; but we believe that only two live in Central and Southern Europe—*A. fluviatilis* and *A. lacustris*. The first constitutes the type of the subgenus *Ancylastrum* Moq.-Tand., 1853 (summit of the shell inclined to the right), the second, the subgenus *Velletia* Gray, 1840 (summit of the shell inclined towards the left). This last is of eocene origin, and more ancient than the first, which appears in the miocene.

(2) **Limnæa stagnalis** L. sp.—“Syst. Nat.,” Ed. X., 1758. I., p. 774 (*Helix*); Costa, “Catal. test. due Sicilie,” 1829, p. cvii., nr. 38; Phil., “Moll. Sic.,” II., 1844, p. 120. Not very abundant and dispersed in small deep waters (Sebeto, lake of Astroni, etc.).

The type of this species has been the origin of many discussions; according to Bourguignat² the type lives in the Danube, near Belgrade, and is common in Sweden, Denmark, Germany, rarer in France, Italy, and Russia. But Locard³ admits as type the figure given by Kobelt in his monograph of European *Limnææ*,⁴ agreeing with the Linnean type and with figures of Lister and Gualtieri.

(3) **L. palustris** Müll. sp.—“Verm. Hist.,” II., 1774, p. 131, n. 326 (*Buccinum*); Costa, “Catal. test. due Sicilie,” 1829, p. cvii. (*Helix*); Phil., “Moll. Sic.,” I., 1836, p. 146; II., p. 120, 1844. In numerous colonies (Paludi, Sebeto, Astroni, Botanical Garden). Smaller and less swollen than the preceding species. Type and varieties very common.

Var. **corvus** Gmelin.—“Syst. Nat.,” Ed. 13, 1778, p. 3665 (*Helix*); Drap., “Tabl. Moll.,” 1805, pl. II., f. 40-41 (*Helix palustris* var. *major*); Phil., “Moll. Sic.,” I., 1836, p. 146 (var. *a*). Shell of large size, violaceous internally.

Var. **fusca** Pfeiffer.—“Deutsch. Moll.,” 1829, I., p. 92, t. iv., f. 25. Smaller than the type, but more swollen.

Var. **elongata** Locard.—“Etud. sur les variat. malac.,” I., 1881, p. 337. Spire elevated, low aperture and deep suture.

¹ “Etude synonymique sur le genre *Ancylus*,” *Spic. Malac.*, p. 139.

² *Spic. Malacol.*, 1862, p. 96.

³ “Etudes sur les variation des mollusques,” iii., I., p. 339.

⁴ *Malakozool. Blätt.*, p. 168, t. ii., f. 1, 1871.

(4) **L. truncatula** Müller sp.—“Verm. Hist.,” II., 1774, p. 130, n. 325; *Linnaeus minutus* Drap., “Tabl. Moll.,” 1801, p. 51; Phil., “Moll. Sic.,” I., 1836, p. 147, and II., 1844, p. 121 (*L. minutus*). Rather common in numerous colonies in muddy waters (Sebeto, Castellammare). Locality first cited by Philippi (II., p. 121).

The geographical area of this species is very extensive and geologically it is ancient. The individuals differ much in the various localities.¹

This *Limnæa* is well distinguished by the cutting off of the whorls and by its tetragonal aperture, these are differences from young individuals or varieties of *L. palustris*. We may give the name of *L. minutus*, following Draparnaud, to the small varieties with deep suture.

Var. **neapolitana** n.f.—Shell smaller and less lofty; ovoid aperture; yellowish color. Not common, in the channels of the Sebeto.

(5) **L. auricularia** L. sp.—“Syst. Nat.,” Ed. X., 1758, vol. I., p. 774 (*Helix*); Costa, O. G., “Catal. test. due Sic.,” p. cvii., nr. 39, pars (*Helix*). In small deep waters amongst aquatic plants (Sebeto and Botanical Garden).

A very variable form living in Europe and Tibet. Philippi says he has never found this species in the Neapolitan region (“Moll. Sic.,” II., p. 120).

(6) **L. limosa** L. sp.—“Syst. Nat.,” Ed. X., 1758, I., p. 774 (*Helix*); Gmelin, “Syst. Nat.,” Ed. XIII., 1778, p. 3667 (*Helix teres*); Drap., “Hist. Moll.,” 1805, p. 50, t. ii., f. 30-31 (*Limnæus ovatus*); Costa, “Catal. Test.,” 1829, p. cvii., nr. 41 (*H. limosa*); *Idem*, p. cvii., nr. 39 (*H. auricularia* non. L., pars); Phil., “Moll. Sic.,” I., p. 146; II., p. 120 (*L. ovatus*). In stagnant waters in numerous colonies (Sebeto, Astroni and Sarno). A very variable form; consequently it is impossible to establish a careful synonymy.

(7) **L. peregra** Müll. sp.—“Verm. Hist.,” II., 1774, p. 130, n. 324 (*Buccinum*); Phil., “Moll. Sic.,” I., p. 146; II., p. 120; Chemnitz, “Conch. Cab.,” IX., t. 135, f. 1244. Common, with its varieties, in running waters and fountains. Longer and less swollen than the preceding species.

Var. **paupercula** Pollonera.—“Moll. fluv. vivent. del Piemonte,” *Boll. Mus. Zool. ed Anat. Comp. R. Univ. Torino*, vol. 4, 1889, p. 4. Smaller, brittle and thinner.

¹ See Clessin: “*Limnæa truncatula*,” *Malakozöologische Blätter*, 1879, p. 30, f. ii.

Var. **gibilmannica** O. G. Costa.—“Corrisp. Zoologica,” p. 113, 1839; Phil., “Moll. Sic.,” II., p. 121, t. 21, f. 5 (*L. solidus*). A cylindrical shell; five whorls slightly channelled, the lowest angular; deep sutures.

L. peregra is a very variable form and we may number as many varieties as habitats.¹ This and the preceding species are modifications of same specific type, whose innumerable variations have been distinguished by more than 300 names.

The genus *Limnæa* Brug., 1791, comprises forms very variable and united by intermediate links. The simplicity of aperture, the uniformity of color, the variability of columella, even in species of the same genus and locality, the difficulty of observing the animals are reasons that hinder the deduction of sure conclusions. The habitat also is of little importance, because a species may reproduce in every region of the earth; *L. minuta*, *L. stagnalis*, *L. auricularia* and *L. peregra* gives us a very good example. Consequently specific characters are established on the proportions of the spire and on the extension of the last whorl.

The *Limnææ* live upon aquatic plants and ascend on the branches for respiration on the surface of the water; often they turn over and by their locomotor train of mucus go trailing along the surface of the water as on a solid body. When the water is low and they cannot submerge themselves they adhere by the mouth to a submerged body and close it by mucus. Some species live also out of the water, like *L. peregra*; others may frequently crawl for days on plants and moist ground.

In *Limnææ*, as in other freshwater shells, we often note the erosion of the shell; this phenomenon may be hereditary, and Locard² thinks it an anomaly of individuals that pass a certain time out of water and have the shell incrustated by earthy substances and cryptogams; Gassies³ supposes the cause of this corrosion to be an aquatic Myriapod, and Fischer⁴ believes that the molluscks take the calcareous matter from other shells, when they need it. He has made convincing experiments on this subject.

(8) **Planorbis fontanus** Lightfoot.—*Phil. Trans.*, XXVI., I., p. 165, t. ii., f. 1, 1786; Drap., “Hist.,” p. 47, t. ii., f. 20-22 (*non Stud.*). In limpid waters on plants (Villa Nazionale, Naples).

¹ Taylor, J. W.: “The variations of *Limnæa peregra* Müll.,” *J. Conch.*, vol. 7, p. 284, October, 1890.

² “Etudes sur les variations malacologiques,” etc., vol. 2, 1881, p. 479.

³ “Tableau méthodique et descriptif des mollusques de l’Agenais,” p. 167.

⁴ *Journal de Conchytiologie*, 1852, vol. 3, p. 303.

(9) **P. complanatus** L. sp.—“Syst. Nat.,” Ed. X., 1758, vol. I., p. 769 (*Helix*); Müller, “Verm. Hist.,” II., 1774, p. 160 (*P. umbilicatus*); Drap., “Hist. Moll.,” p. 45, t. ii., f. 11, 12, 15 (*P. marginatus*), Costa, “Catal. test. due Sicilie, 1829, p. cvii., nr. 36, pars (*Helix carinata*); Phil., “Moll. Sic., I., p. 145; II., p. 119 (*P. marginatus*). The most common species of *Planorbis* with us, abounding in stagnant waters and rivulets in numerous colonies.

P. complanatus is common in the Mediterranean littoral, Europe and Siberia, and frequently varies. The type must have the inferior keel and it is allied to the following species, from which it is distinguished by the thickness and less compression of the last whorl. The shell is always incrustated by vegetal organisms which conceal its color.

Var. **submarginatus** De Crist. et Jan.—“Catal.,” 1871, XX., n. 9, 12. Less common.

(10) **P. carinatus** Müller.—“Verm. Hist.,” 1774, II., p. 157 (*non Studer*). More common and localised than the preceding, with which it lives together, also thinner and more pellucid than *P. complanatus* and with the keel central.

The last two forms of *Planorbis* are united by the variety *submarginatus*. The keel is inferior in *P. complanatus*, central in *P. carinatus* and occupies an intermediate situation in the above-mentioned variety.

(11) **P. subangulatus** Phil.—“En. Moll. Sic.,” II., 1844, p. 119; t. xxi., f. 6; Bourg., “Malac. Algerie, 1864, p. 153, t. ix., f. 27-30; Locard, “Conch. Portugaise,” 1899, p. 179. In company with the other species. The original locality cited by Philippi is “in rivulis prope Panormum frequens.”

I have never found *Planorbis corneus* near Naples, though Philippi has seen it (I., p. 146); but his citation is not confirmed in the second volume of his work.

PHYSIDÆ.

(12) **Physa contorta** Mich.—*Bull. Soc. Linn. Bordeaux*, 1829, t. 3^d. p. 268, f. 15-16; Phil., “Moll. Sic.,” I., p. 47, t. ix., f. 1 (*P. rivularis*), II., p. 120 (*P. contorta*). In small clear waters.

(13) **P. fontinalis** L. sp.—“Syst. Nat.,” Ed. X., 1758, vol. i., p. 127 (*Bulla*); Müll., “Verm. Hist.,” II., p. 165 (*Planorbis bulla*); Costa, “Catal. test. due Sic.,” 1829, p. cvii., nr. 37 (*Bulla f.*); Phil., “Moll. Sic.,” II., p. 120. In clear waters on the plants. This species, living in Southern Europe and the Canary Islands (Webb & Berthelot), is allied to *P. contorta*, a distinctly southern form, but the shell is less swollen.

Var. **major** Locard.—“Etud. sur les variat.,” I., 1881, p. 312. Larger; rare.

(14) **P. (Aplexa) hypnorum** L. sp.—“Syst. Nat.,” Ed. X., I., p. 727 (*Bulla*); Müll., “Verm. Hist.,” II., p. 169, nr. 354 (*Planorbis turritus*). Not common, on plants, near borders of rivulets and on moist mosses. This species is well distinguished by its yellow gold color, its lustre and elongated form.

PROSOBRANCHIATA.

HYDROBIIDÆ.

(15) **Pseudamnicola macrostoma** Küster sp.—“Chem. Conch. Cab.,” ed. nova, 1845, p. 73, t. 13, f. 5-7 (*Paludina*); Fitzgerald, “Land Shells of Capri,” *J. Conch.*, 1877, vol. i., p. 12 (*Bithynia similis*, non Drap.). Very rare in Capri with *Ancylus margaritaceus* and also in a fountain in the Botanical Garden.

The species of the genus *Pseudamnicola* Paulucci, 1878, were included by some authors in the American genus *Amnicola* Gould et Hald., from which they were separated by the characters of the radula, which is furnished only with a small basal tooth.

(16) **Bithynia tentaculata** L. sp.—“Syst. Nat.,” Ed. X., I., p. 774 (*Helix*); Müller, “Verm. Hist.,” II., p. 185, nr. 372 (*Nerita iaculator*); Drap., “Tabl.,” 1801, p. 41 (*Cyclostoma impurum*); Costa, “Catal. test. due Sicilie,” 1829, p. lcvii., nr. 43 (*Helix t.*); Phil., “Moll. Sic.,” I., p. 148 (*Paludina impura*), II., p. 122. Common, with its varieties, in numerous colonies, in every water or fountain. This form is ancient and dates from the miocene period to the present. Very variable; the extreme variations of form are: var. *codia*, swollen, and var. *producta*, elongated.

Var. **producta** Menke.—“Syn. method. mollusc.,” 1830, p. 41. More elongated than the type and large; pale yellowish in color; rare.

Var. **ventricosa** Westerlund.—“Fauna Sueciae,” 1873, p. 460 (=var. *neapolitana* Blanc, *in schedis*). Swollen form.

Var. **codia** Bourg.—“Spic. Malac.,” p. 136, t. viii., f. 5-7, 1862. Also more contracted variety and the last whorl occupies almost the whole shell. The type lives in Pisa, and is common in Central Italy.

Var. **sebethina** Blanc (*in schedis*).—Coutagne, “Note faune malacol. bass. du Rhône,” I., 1881, p. 24; Locard, “Catal. génér. moll. terr. et fluviat. de France,” p. 224, 1882; Locard, *Ann. Mus. Hist. Nat. de Genève* 1894, p. 85, pl. v., f. 3. Rather a common form in the River Sebeto.

Var. **fulva** Locard.—“Etudes sur les variat.,” etc., 1881, p. 367. Reddish color; common.

Var. **cornea** Locard.—“Etudes sur les variat., etc.,” 1881, p. 367. Pale yellowish in color and translucent. Very common.

Var. **cinerea** Locard.—“Etudes sur les variat., etc.,” 1881, p. 367. Grayish in color, translucent, often incrustated. Common.

(17) **B. boissieri** Charp. in Küster—“Die Gattung. Paludina,” p. 35, t. vii., f. 30, 32; 1852. Not common, in stagnant waters. The type lives near Rome.

Var. **curta** Paulucci.—*In* Caroti, “App. sulle Paludinacee italiane,” *Boll. Soc. Malacol. Ital.*, 1883, vol. ix. Last whorl of the shell more swollen than in the type; it is allied to *B. leachi* var. *italica* Paulucci.

(18) **B. rubens** Menke sp.—“Synops. method. mollusc.,” 1830, p. 134 (*Paludina*); Phil., “Moll. Sic.,” I., p. 148, II., p. 122. Originally cited as living in the Lake of Patria (Philippi and Küster), it is found common in the channels of the Sebeto and in the fountains in the Botanical Garden.

This species differs from *B. tentaculata* by its smallness, ovoid form, translucidity, reddish color and white operculum. It is the southern representative of *B. leachi* Shepp. var. *troscheli* Wieg., which does not live in Italy. The swollen varieties pass into *B. orsinii* Charp. in Küst., distinguished by last whorl being swollen and elongated. The type of Menke lives in Sicily.

VALVATIDÆ.

(19) **Valvata piscinalis** Müller sp.—“Verm. Hist.,” II., p. 172, nr. 358 (*Nerita*); Drap., “Tabl.,” 1801, p. 39 (*Cyclostoma obtusum*); Phil., I., p. 147, II., p. 121. In clear and limpid waters; not common.

Var. **parthenopæa** n.f.—More elongated ovoid aperture; chamferings less deep; reddish yellow color with horny lustre. In the channels of the Sebeto.

NERITIDÆ.

(20) **Neritina fluviatilis** L. sp.—“Syst. Nat.,” Ed. X., 1758, I., p. 777 (*Nerita*); Costa, “Catal. test.,” p. cviii., nr. 45 (*Nerita*). In the river Sarno upon submerged stones in shallow water.

PELECYPODA. TETRABRANCHIA.

UNIONIDÆ.

(21) **Unio requieni** Mich.—“Compl. hist. moll.,” 1831, p. 106, tal. xvi., f. 24. In the river Sarno. A very variable form allied principally to *U. pictorum*, the separation being only possible in the

best specimens; it is smaller and more elongated and the beak less developed and the cardinal tooth shorter.

In the last few years the European fauna has been enriched by so many named *Uniones* that Morelet¹ jestingly wrote: "elle rivalisera bientôt, au moins dans sa nomenclature, avec celle de l'Amérique du Nord."

CYRENIDÆ.

(22) **Sphærium corneum** L. sp.—"Syst. Nat.," Ed. X., I., p. 768 (*Tellina*); Müll., "Verm. Hist.," II., p. 202, nr. 307 (*T. rivalis*); Phil., "Moll. Sic.," II., p. 30 (*Cyclas*). In shallow and muddy waters in numerous colonies.

(23) **Pisidium pusillum** Gmel. sp.—"Syst. Nat.," Ed. XIII., 1788, p. 3231 (*Tellina*); Drap., "Tabl. Moll.," 1801, p. 105, *pars* (*Cyclas fontinalis*); Phil., "Moll. Sic.," II., p. 31 (*P. fontinale*); Costa, O. G., "Fauna Siciliana, Fasc. I., fig. 2 (*Galileja tenebrosa*). Not common, in fountains in the Botanical Garden, and in the channels of the Sebeto.

The smallest of the European species of this genus. The genus *Galileja*, established by the late Prof. Costa on specimens from the Vaccarizzo rivulet, near Gibilmanna, in Sicily, cannot be accepted, because it is founded on the characters of the hinge, which are very variable in species of these genera; and we must also reject the specific name *tenebrosa*, because the crust covering the individuals examined by him is common to almost all freshwater shells, arising from the confervæ that grow in earthy matters on the shell. These cryptogamous plants and the shell grow simultaneously and consequently the color is concealed.

(24) **P. casertanum** Poli.—"Test. Utr. Sic.," I., 1791, p. 65, t. xvi., f. 1 (*Cardium*); Costa, "Catal. test. Sic.," p. xxviii., nr. 10 (*Cardium*). A species localised in a few places. The type of Poli lives in the Royal Park of Caserta; but the form is very variable and rich in numberless synonyms.

Var. **australis** Phil.—"Moll. Sic.," I., p. 39, t. xxv., f. 11; II., p. 31. More inequilateral and less thick than the type.

(25) **P. amnicum** Müller sp.—"Verm. Hist.," II., p. 205, nr. 389 (*Tellina*); Drap., "Tabl. Moll.," p. 186 (*Cyclas palustris*); Drap., "Hist. Moll.," p. 131, t. x., f. 17-18 (*Cyclas palustris*). Common in muddy waters (Sebeto) near aquatic plants. Also from the Sarno (Philippi), but in this locality I have never found it.

Young specimens are allied to *P. casertanum*.

DISTRIBUTION OF THE NEAPOLITAN FRESHWATER SHELLS.

NAME OF SPECIES.	GEOGRAPHICAL DISTRIBUTION.						GEOLOGICAL DISTRIBUTION.									
	Circa- amedit- manic	Ger- at- lantic	Pontic	Cas- pian	Si- beria	Tibet	Ma- deira	Canary	Inf. Mioc.	Inf. Plioc.	Middle Plioc.	Upper Plioc.	Inf. Pleist.	Middle Pleist.	Upper Pleist.	Actual
<i>Ancylus fluviatilis</i> ..	x	..	..	..	..	..	..	..	..	..	..	..	..	..	..	x
* <i>Limnea stagnalis</i> ..	x	x	x	x	x	x	..	..	..	..	..	..	..	..	..	x
* <i>L. palustris</i> ..	x	x	x	x	x	x	x	x	..	..	..	..	..	..	..	x
* <i>L. truncatula</i> ..	x	x	x	x	x	x	x	x	..	..	..	..	..	..	..	x
* <i>L. auricularia</i> ..	x	x	x	x	x	x	x	x	..	..	..	..	..	..	..	x
* <i>L. limosa</i> ...	x	x	x	x	x	x	x	x	..	..	..	..	..	..	..	x
* <i>L. peregra</i> ..	x	x	x	x	x	x	x	x	..	..	..	..	..	..	..	x
<i>Planorbis fontanus</i> ..	x	x	x	x	x	x	x	x	..	..	..	..	..	..	..	x
* <i>P. complanatus</i> ..	x	x	x	x	x	x	x	x	..	..	..	..	..	..	..	x
<i>P. carinatus</i> ..	x	x	x	x	x	x	x	x	..	..	..	..	..	..	..	x
<i>P. subangulatus</i> ..	x	x	x	x	x	x	x	x	..	..	..	..	..	..	..	x
<i>Physa contorta</i> ..	x	x	x	x	x	x	x	x	..	..	..	..	..	..	..	x
<i>P. fontinalis</i> ..	x	x	x	x	x	x	x	x	..	..	..	..	..	..	..	x
* <i>P. hypnorum</i> ..	x	x	x	x	x	x	x	x	..	..	..	..	..	..	..	x
<i>Pseudamnicola macrostoma</i> ..	x	x	x	x	x	x	x	x	..	..	..	..	..	..	..	x
<i>Bithynia tentaculata</i> ..	x	x	x	x	x	x	x	x	..	..	..	..	..	..	..	x
<i>B. boissieri</i> ..	x	x	x	x	x	x	x	x	..	..	..	..	..	..	..	x
<i>B. rubens</i> ..	x	x	x	x	x	x	x	x	..	..	..	..	..	..	..	x
* <i>Valvata piscinalis</i> ..	x	x	x	x	x	x	x	x	..	..	..	..	..	..	..	x
<i>Neritina fluviatilis</i> ..	x	x	x	x	x	x	x	x	..	..	..	..	..	..	..	x
<i>Unio requienii</i> ..	x	x	x	x	x	x	x	x	..	..	..	..	..	..	..	x
<i>Sphaerium corneum</i> ..	x	x	x	x	x	x	x	x	..	..	..	..	..	..	..	x
* <i>Psidium pusillum</i> ..	x	x	x	x	x	x	x	x	..	..	..	..	..	..	..	x
<i>P. casertanum</i> ..	x	x	x	x	x	x	x	x	..	..	..	..	..	..	..	x
* <i>P. amnicum</i> ..	x	x	x	x	x	x	x	x	..	..	..	..	..	..	..	x

The species marked * live also in the Boreal region.

FURTHER OBSERVATIONS ON THE MOLLUSCAN FAUNA OF GRANGE-OVER-SANDS, LANCS., AND DISTRICT.

BY JOHN W. JACKSON AND CHAS. H. MOORE.

(Read before the Society, November 11, 1903).

IN July last we spent some time in the above neighbourhood hunting for shells. We had not much hope of finding anything new to the district, as Mr. Standen worked it pretty thoroughly in 1897.¹ We are, however, pleased to be able to add several species to his list, some of these being particularly interesting, notably *Vitrea lucida*, of which we found two specimens.

Our researches were not confined to Grange itself, but excursions were made to places near at hand. Several days were occupied, both in company and individually, in searching Eggerslack Wood, where Mr. Standen made most of his finds; it is by far the most productive place in the whole district. The moss-covered stone walls in this wood yielded a rich harvest in the way of *Vertigines*, one of the writers taking over one hundred and twenty specimens of *V. alpestris*. This species, on reference to Mr. Standen's list, will be seen to be an addition to the district. In company with the above we found *Vertigo pusilla*, *V. pygmæa*, *Punctum pygmæum*, *Vallonia pulchella* var. *costata*, all fairly numerous, with odd specimens of the various *Vitreæ*, *Cochlicopa lubrica*, *Balea perversa*, etc.

Amongst the undergrowth and under the stones lying about in the wood, the following species were fairly numerous:—*Helicigona arbus-torum*, *Helix nemoralis*, *Hygromia rufescens*, *Acanthinula aculeata*, *Hygromia hispida*, *Pyramidula rotundata*, *Vitrea cellaria*, *V. alliaria*, *V. nitidula*, *V. pura*, and var. *nitidosa*, *Euconulus fulvus*, *Vitrea crystallina*, *Cochlicopa lubrica*, and var. *lubricoides*, and *Vitrina pellucida*. Dead branches and sticks yielded *Vertigo substriata* (sparingly), *Ena obscura* (common), *Sphyradium edentulum*, *Clausilia bidentata* (common), and var. *tumidula*, *Cl. laminata* (sparingly). Under some large stones colonies of *Jamania cylindræa* were found, including two specimens of the var. *alba*, and one or two approaching the var. *curta*. *Carychium minimum* was also common amongst the moss and dead leaves. *Arion ater* and *Limax arborum* were fairly numerous in the wood, and *Arion hortensis* was observed under stones on the Windermere Road. Here also occurred *Hygromia granulata*.

The chief attraction to this wood was the hope of taking *Acicula lineata*, recorded from there by Mr. Standen; a single specimen of it was taken by one of the writers in March of this year. We were

on the point of giving up our search when three dead specimens were turned up. This put new life into us, but notwithstanding our efforts, no living examples were found.

We must not omit to mention here that we received a permit to go anywhere about the wood, through the kindness of a gentleman staying in the neighbourhood. This helped us considerably, as we had then no fear of being molested for being off the public track through the wood.

By far the commonest shells of the district appeared to be *Pyramidula rupestris*, which occurred on almost every wall, and *Hygromia rufescens*, with its vars. *rubens*, *albo-cincta*, and *alba*. One specimen of the latter species had the spire remarkably produced.

Another day was spent in exploring Holme Island opposite Grange, which is practically an outlier of mountain limestone, connected with the mainland by a causeway. It is about eleven acres in extent, the greater portion being under cultivation, and we had not much hope of any success here. We confined our researches to the extreme point of the island where it juts out into the sea, and here amongst the rocks and vegetation were found:—*Helix aspersa*, *H. nemoralis*, *H. hortensis*, *Hygromia rufescens*, *Hy. hispida*, *Helicella caperata*, *Pyramidula rotundata*, *Vitrea alliaria*, *V. nitidula*, *Cochlicopa lubrica*, *Vitrina pellucida*, *Clausilia bidentata*, and *Jaminia cylindracea*.

The remainder of the day was spent in examining the hedges at Low Meathop, where *Pomatias elegans* has been known to occur for several years. A number of the type, along with the var. *ochroleuca*, were taken, as well as specimens of *Helix aspersa*, *H. hortensis*, *Hygromia hispida*, *Hy. rufescens*, vars. *rubens* and *depressa*, *Vitrea cellaria*, *V. alliaria*, *Ena obscura*, *Clausilia laminata*, and *Jaminia cylindracea*.

On returning to Grange, the cliffs on Lindale Road were examined, and here *Helicella caperata* and var. *ornata* occurred commonly, with several of the species mentioned above. The chief prize, however, was *Vitrea lucida*.

The following day was spent at Cark and Holker, where we added several freshwater shells to our list. In a brook not far from the station we found *Limnæa pereger*, *L. palustris*, *L. truncatula*, *Planorbis albus*, *Pl. contortus*, *Neritina fluviatilis*, *Valvata piscinalis*, *Ancylus fluviatilis*, and var. *albida*, and *Physa fontinalis*. We then proceeded on through Holker, collecting specimens of *Vertigo alpestris*, *V. pusilla*, *Punctum pygmæum*, *Balea perversa*, and various other species from the walls along the road. Our return journey led us through Cartmell to Grange, and in the hedges we found a repetition of several of the species mentioned above, including *Helix aspersa* and *H. hortensis* vars. *lutea* and *coalita*.

It will be seen from the above result of our researches in this district, that its molluscan fauna is comparatively rich, and would well repay more systematic research than our limited time allowed. We would suggest that future workers might profitably investigate that portion of the district unexplored by us, lying north of a line drawn from Eggerslack Wood through Cartmell to Holker. Humphrey Head, the nearest station to which is Kent's Bank, about two miles from Grange, might also be worked, as quantities of dead shells are to be picked up at the base of the steep cliffs, having been washed down from above. Amongst the shells thus found are *Helix aspersa*, *H. nemoralis*, *H. hortensis*, *Hygromia rufescens*, *Pyramidula rotundata*, *Vitrea cellaria*, *V. alliaria*, *V. nitidula*, *Clausilia bidentata*, and *Pomatias elegans*. Very good specimens of *Clausilia bidentata* and its var. *cravenensis* are to be found clinging to the rocks, and doubtless if the cliffs were scaled, and the rocks examined carefully, many other living species would be acquired.

Of the species mentioned in the above paper, we find that the following are additions to the records for district 69 of Mr. Lionel E. Adams' last Census:—

Vitrea lucida,
Punctum pygmæum,
Vertigo pygmæa,
V. substriata,

Planorbis contortus,
Acicula lineata,
Neritina fluviatilis.

Note on the Land and Freshwater Shells of Lancaster.—Preparatory to an exhaustive list of the mollusca of this district, a few notes on the most interesting species may be acceptable. This list is confined to the millstone grit formation, and as the limestone begins about Carnforth, a radius of six miles may be roughly taken. In the canal are *Planorbis umbilicatus*, *P. albus*, *P. fontanus*, *Valvata piscinalis*, *V. cristata*, *Neritina fluviatilis*, *Dreissensia polymorpha*, *Physa fontinalis*, and several of the commoner species. On the canal margins are *Hyalinia nitida*, *H. radiatula*, *H. pura* var. *nitidosa*, *Helix granulata*; in the deeply-wooded cutting south of the town are *Vertigo edentula*, *Helix aculeata* and *Hyalinia fulva*. In the river Lune are *Unio margaritifera* and *Limnaea auricularia*. In a ditch near Lady's Walk, at the north-end of the town, subject to additions of salt water from the river, is *Pisidium pusillum* var. *grandis* and deformed specimens of *Planorbis umbilicatus*. The typical land shell of the district is *Helix rufescens*. *Helix nemoralis* and *H. hortensis* are fine, but extremely local, the former preferring high ground above Scotforth, and the latter the river valley. *H. caperata* occurs on the Morecambe-road. At Caton *H. pygmæa* is common on dead oak leaves, and on the river bridge one specimen of *Clausilia laminata* has been found. In a pond close to the salt marshes of the river estuary is *Sphærium lacustre* var. *ryckholtii*. Out of a total of fifty-four species, the following are not included in the Census for 1902: *Hyalinia radiatula*, *H. fulva*, *Helix pulchella*, *H. granulata*, *Clausilia laminata*, *Sphærium lacustre*, *Pisidium pusillum*, *Dreissensia polymorpha* and *Unio margaritifera*, the two latter names, however, are by no means new records.—J. DAVY DEAN (Read before the Society, Oct. 14th, 1903).

IMPERFORATE HALIOTIS TUBERCULATA.

By E. D. MARQUAND, A.L.S.

(Read before the Society, February 10, 1904).

ABOUT eleven years ago Mr. Edgar A. Smith, F.Z.S., announced in the *Conchologist*, vol. 2, p. 75, the presentation to the British Museum of an Ormer shell, in which the characteristic perforations are entirely absent: a peculiarity which, Mr. Smith remarked, "appears to be of the greatest rarity, for I only find that one notice of its occurrence has ever been published; nor has it been observed by any of the conchologists and others whom I have consulted." The record alluded to occurs in Jeffreys' "Brit. Conch.," vol. 3, p. 281, where the author states, speaking of *Haliotis tuberculata*, that "one in Mrs. Collings' collection has no orifice, although it is about an inch and a quarter in length."

I am pleased to be able to record the occurrence of another example, which was found on the famous shell beach at Herm, about thirty years ago, by the late Mrs. R. S. Boley, of Guernsey, who treasured it as a curiosity, until I informed her of its extreme rarity; and a few months before her death she most kindly presented it to me. This specimen is smaller than the others, being only 12 millimetres in length, whereas the one mentioned by Jeffreys, which I have lately had an opportunity of examining, is 28 millimetres long, and the British Museum example Mr. Smith says measures two and a quarter inches (56 mm.).

Jeffreys was mistaken in supposing that the imperforate specimen he mentions was "in Mrs. Collings' collection,"—but the error is easily explained. In the early sixties Jeffreys used to come over to Guernsey shell-collecting, and became very intimate with the Lukis family, more especially with the late Dr. F. C. Lukis, who was an ardent conchologist. This gentleman's two sisters, the late Mrs. Collings, the wife of the then Seigneur of Sark, and Miss Lukis, who is still living, had also studied the shells of these islands, and, of course, submitted their collections for the inspection of the author of "British Conchology;" and so, quite unintentionally, Mrs. Collings got the credit of possessing a shell which had really been found by, and had always belonged to, her sister.

Miss Lukis, who distinctly remembers showing the shell to Jeffreys, tells me she found it alive on the north coast of Guernsey; but she does not recollect noticing any peculiarity about it at the time; and it was only after the shell had been cleaned (it still shows traces of animal matter) that the absence of holes was discovered.

I cannot say what the outside of this original specimen is like, as it is gummed down on a tablet; but in the Herm example a series of tubercles replaces the apertures, so that, without close examination, there is nothing externally to mark its peculiarity. Hence, I imagine it would be difficult to detect the absence of holes in a small living Ormer. If another specimen could be found alive, the dissection of the animal would settle the interesting question whether or not the slit in the mantle is, as Mr. Smith suggests, altogether wanting.



Report on the Wirral Peninsula Ramble, July 11th, 1903.—During the walk from Meols station to the shore a few common mollusca were picked up, but our principal object was to reach the locality of *Barnea candida* at the submerged forest between Leasowe and Hoylake. The remains of this ancient forest are covered by a thick bed of peat, in which stand the stumps of numerous trees—oak, willow, alder, birch, and elm being easily distinguishable. On the surface of this bed many freshwater shells may be found, very fragile, but perfectly recognisable, their presence denoting that before the sea overwhelmed this tract a swamp or freshwater lake covered the spot. Where Birkenhead Docks now are was once the heart of a forest of birch (“Birchen Wood” it was anciently called). The boundary of this submerged forest we can only approximately trace, but it is certain that all writers, ancient and modern, describe this bay as having been inhabited by man and beast at an early period. According to ancient maps and records, the devastation of the Wirral shore-line must have been very great. Formerly, from the Ribble to the Dee, and from a great distance seaward, extending inward up the valleys of these rivers, the country was clothed with trees. All this wooded country has now utterly disappeared, with the exception of the remnants visible at low tide. Fortunately the tide was sufficiently low for our purpose, and very soon we came across some fine colonies of *Barnea candida*, the mollusks making their presence known by the spirts of water from their siphons, as we walked over the sodden and slippery peat. The peat, where they occur, is simply honeycombed with their countless burrows, and it was an entirely new experience to most of the party to break off portions of the wave-worn peat ridges, and find them full to overflowing with individuals in all stages of growth. After obtaining as many of these shells as desired, and picking up a few of the common littoral shells, we left the shore for the sand-hills, and were pleased to find that the colony of *Helix acuta* had not been destroyed by the encroachments of the sea, or the construction of the immense new breakwater. Under the stones behind the sea-wall *Helix nemoralis*, *H. caperata*, and *Jamnia muscorum* occurred, and in the moist places *Succinea elegans*. We made a careful search amongst the sand-hills for the “pockets” of wind-blown shells, which are in some places so productive. The results obtained from the sifting of a number of “pockets” does not indicate a great abundance of mollusca in this locality; we only got *Vitrina pellucida*, *Helix acuta*, *H. hispida*, *H. caperata*, *H. nemoralis* (juv.), *H. aspersa* (juv.), *Vitrea pura*, *Jamnia cylindracea*, *J. muscorum*, *Vertigo pygmaea*, *Cochlicopa lubrica*, *Succinea elegans* and *Paludetrina stagnalis*.—R. STANDEN (Read before the Society, Oct. 14, 1903).

NOTES ON THE GENUS AMPULLARIA.

BY WILLIAM HEALEY DALL, A.M., Sc.D.

(Read before the Society, February 10, 1904).

THE first reference to the shells of this genus as distinguished from *Helix*, *Planorbis*, etc., is to be found in the "Museum Calonnianum," in 1797. This publication was a sale catalogue issued, without any name of author or publisher, by G. Humphrey, an auctioneer and dealer, to whom had been consigned the collection of M. de Calonne, driven from France by the political troubles of the Revolution of 1793. The book is rare and was doubtless sent out to such amateurs as the seller thought likely to participate in purchases. For some reason, however, the collection was not sold at the time.

The shells contained in the Calonne collection comprised, among others, the collection originally belonging to M. Hvass, sometime Danish Consul at Paris, to whom the monograph of the genus *Conus* in the "Encyclopédie Méthodique" is due. Hvass was a bachelor, who lost his fortune by the outbreak of the French Revolution, which obliged him to sell his shells, which were bought by M. de Paris, from whose possession they passed into that of M. de Calonne. Shortly afterwards Hvass died. The collection seems to have been sent to England and sold as a whole to G. Humphrey, together with a manuscript by Hvass in which they were classified. I was informed by the late Sylvanus Hanley and J. Gwyn Jeffreys that the tradition was that Humphrey put the manuscript into the hands of E. M. DaCosta, by whom it was seen through the press, and who made a few alterations, though as a whole the arrangement of Hvass was not changed. Most of the copies (I have seen five, of which I own two, while another is in the Library of Congress)¹ bear annotations and changes in a hand which agrees well with that of Humphrey's labels, some of which were preserved in the Jeffreys Collection now in the U.S. National Museum. One copy, which has passed through the hands of Spengler, Counsellor of State Thomsen, Röding, H. Beck, R. Berg, O. A. L. Mörch and myself, has a contemporary MS. note in the supposed hand of Humphrey, adding to paragraph 1, page 5, the words, "from a mscr. of Mr. Hvas." There is also a note by Mörch stating that Röding received from Humphrey colored plates illustrating part of the collection; which I suppose may have been what has been noted in bibliographies as the "Museum Hunfredianum," a work which appears to have been wholly lost.

¹ A copy is in the library of the Manchester Museum.—W.E.H.

However great an improvement on the contemporaneous classifications the work of Hvass may have been when it was written, it contains nothing which is of scientific value at the present time. Owing, doubtless, to the prevalence of war, it was unknown on the continent, and unreferred to in systematic conchology until nearly fifty years later, when, in 1845, Menke took notes from the copy above described. About half-a-dozen copies are known.

I have held that, as an anonymous pamphlet not issued for sale and bearing the name of neither author nor publisher, it is not entitled to be cited for systematic names. As there are neither diagnoses, nor figures given or cited, it was barred by the British Association rules of 1842. From the history which I have recorded above, it is evident that if anyone is given credit for the names (should they be cited) it should be Hvass and not Humphrey. I may add that a large number of the best known names in the science would be overthrown and reduced to synonymy if the names of the "Museum Calonnianum" are accepted, and without the slightest benefit to science. Among them is the name of the genus which is the subject of these notes.

Popularly known as the "Apple Snail" we find it called *Pomus*, and, though five nude specific names are given in the list, only one of them is identifiable, *P. ampullacea*, of China, to which is added as a synonym "*Helix ampullacea* Linn."

The following year appeared the "Museum Boltenianum" in which, though no diagnoses were given, full citations of name, volume, page and figure of previous authors were provided, and there seems to be no way in which we can consistently refuse to adopt the Boltenian name if we accept any names given without a diagnosis, as has now become a common practice.

Bolten proposes the name *Pila* (a ball) for the apple snails, and divides the forms commonly included under *Helix ampullacea* Linné, into six species, retaining the name *ampullacea* for one of them. *Pila* had not previously been used by any binomial author for a genus of animals. Bolten specifies no type and his list includes both Asiatic species, with a calcareous operculum, and American forms with a horny one. In 1799 Lamarck proposed the name of *Ampullaria* with the sole example cited *Helix ampullacea* L. The original type of this species—for which the name *ampullacea* must be preserved, in contradistinction to those allied forms previously associated with it—is the shell figured from the original by Philippi in his monograph of *Ampullaria* ("Conch. Cab.", ed. Küster, p. 62, pl. 20, fig. 6), under the name of *A. Linnaei*; and also by Reeve ("Conch. Icon.", ix., *Ampullaria*, pl. 24, fig. 115). This is an Asiatic species with a calcareous operculum. But Lamarck, like his contemporaries, included

a number of species under the name *ampullacea*, and the trivial name "cordon bleu," which he used with it was applied to an American species by Favanne. In 1801, in his "Système des animaux sans vertèbres" (p. 93), Lamarck adds to his diagnosis the statement "muni d'un opercule corné." This must be taken as settling the name of *Ampullaria* definitely on the species with a horny operculum, leaving those with a calcareous operculum to carry the Boltenian designation, *Pila*. Gray (1824) and Guilding (1828) afterwards divided the genus in the same sense. Gray's *Marisa* being intended to cover *Ampullaria* s.s., and not the *Helix cornu-arietis* which has so persistently and inaccurately been asserted to be the type of *Marisa*.

It is a somewhat singular fact that the Old World forms appear to be dextral with an externally calcareous operculum, or sinistral with a horny one; while those of America all have an operculum externally horny, and are dextral. Of the latter South America is the great metropolis, most of the species being found in the Caribbeean or Atlantic drainage. In the highlands of Colombia, Ecuador and Peru, a small group of species is found in which the pillar is heavy and callous, the umbilicus closed with a pad of callus, as in *Natica clausa*, while the other characters are as usual in *Ampullaria*. *Ampullaria columellaris* Gould may serve as type of this section which I propose to call *Limnopomus*.¹ The sinistral forms with a horny operculum are wholly African. The forms with a calcareous operculum and dextral, globose shell, are African or Asiatic. The eggs have a calcareous coat and are laid in large masses on the stems of reeds above water. They are usually, when fresh, of very attractive colors—crimson, pale pink, or bluish green—which are apt to fade when the egg-mass is dried or put in alcohol. The nepionic shell has spiral rows of delicate hairs and a well developed operculum before it leaves the egg-shell, the Oriental species even have the shelly coat of the operculum developed before hatching.

The following key will enable one to trace the subdivisions of the group:—

- | | |
|---|------------------------|
| Operculum externally calcareous. | <i>Pila</i> . |
| Respiratory siphon long. Shell solid. Color uniform | |
| or spirally banded. | <i>Pila</i> s.s. |
| Shell very delicate. Color nebulous. | <i>Saulea</i> . |
| Operculum externally horny. | <i>Ampullaria</i> . |
| Shell dextral. | |
| Respiratory siphon long. | |
| Pillar not callous, umbilicus open. | |
| Shell globose. | <i>Ampullaria</i> s.s. |

¹ *A. castilloi* Sowerby, appears also to belong to this group.

Shell planorboid.	<i>Ceratodes</i>
Pillar callous, umbilicus filled with callus.	
Shell globose.	<i>Limnopomus</i> .
Pillar appressed, spire depressed.	
Shell few whorled, spirally sculptured.	<i>Pomella</i> .
Respiratory siphon absent or obsolete.	
Shell globose.	<i>Asolene</i> .
Shell sinistral.	
Umbilicate, form trochoid.	<i>Lanistes</i> .
Imperforate, form bulimoid.	<i>Meladomus</i> .

A very detailed account of the habits and mode of respiration of the American *Ampullaria* is given by Bayay (*J. de Conchyl.*, vol. 23, pp. 298-305, October, 1875), and of the Asiatic form by Ramanan (*J. Malacol.*, vol. 10, pp. 107-113, December, 1903). A partial synonymy of the various groups follows, from which the main systematic vicissitudes through which they have passed may be deduced. The soft parts of *Limnopomus*, *Pomella*, *Lanistes* and *Meladomus* are still in need of description and illustration.

Genus PILA (Bolten).

Type *Helix ampullacea* Linné, Asia.

- 1797. *Pomus* (Anonymous) Mus. Calonnianum, p. 58, [sole ex. *Helix ampullacea* L., China].
- 1798. *Pila* Bolten, Mus. Boltenianum, ed. i., p. 145, *ex parte*.
- 1799. *Ampullaria* Lamarck, Prodrôme, p. 76, *ex parte*.
- 1817. *Conchylium* Cuvier, Règne An., ii., p. 426, *ex parte*.
- 1821. *Ampullaria* Sowerby, Genera, iv.; *A. rugosa* Lam.
- 1828. *Pachystoma* Guilding, Zool. Journ., iii., p. 536 [*A. globosa* Swainson, type, p. 539. Not *Pachystomus* Latreille, Diptera, 1809, nor Gray, 1840].
- 1840. *Pachylabra* Swainson, Malac., p. 339 [*A. globosa* Sw.].
- 1842. *Pornus* Sowerby, Conch. Man., ed. ii., p. 235; (Err. typ.).
- 1847. *Pomus* Gray, Proc. Zool. Soc., p. 148 [*H. ampullacea* L.].
- 1854. *Ampullaria* H. & A. Adams, Gen. Rec. Moll., i., p. 345.
- 1859. *Ampullaria* Chenu, Man. de Conchyl., p. 313.
- 1883. *Ampullaria* Tryon, Struct. and Syst. Conch., ii., p. 276.
- 1885. *Pachylabra* Fischer, Man. de Conchyl., p. 757 [*H. ampullacea* L.].

Subgenus SAULEA Gray.

Type *Helix vitrea* Born, Sierra Leone.

- 1867. *Saulea* Gray, Proc. Zool. Soc., p. 1,000 [not *Saula* Gerst., Coleoptera, 1858].
- 1871. *Saulia* Crosse, J. de Conchyl., xix., p. 144.
- 1883. *Saulea* Tryon, Struct. Syst. Conch., ii., p. 276.
- 1885. *Saulea* Fischer, Man. de Conchyl., p. 757.

Genus AMPULLARIA Lamarck.

Type *Nerita urceus* Müller, Mississippi.

- 1799. *Ampullaria* Lamarck, Prodrôme, p. 76, *ex parte*.
- 1801. *Ampullaria* Lamarck, Système, p. 93.

1810. *Ampullarius* Montfort, Conch., ii., p. 242 [*A. urceus* Brug.].
 1811. *Pomacea* Perry, Conch., expl. pl. 28, [*P. maculata* P.].
 1817. *Conchylidium* Cuvier, Règne An., ii., p. 426, *ex parte*.
 1824. *Marisa* Gray, *Phil. Mag.*, lxxiii., p. 276 [*M. intermedia* Gray].
 1828. *Ampullaria* Guilding, *Zool. Journ.*, iii., p. 536.
 1830. *Marissa* Menke, Synops., ed. ii., p. 49, in synonymy [not *Marissa* Walker, *Lepidoptera*, 1854].
 1840. *Marisca* Gray, Syn. Brit. Mus., pp. 59, 89 (err. typ.) [not *Marisca* Gistel, *Aves*, 1848].
 1842. *Amphibola* Sowerby, Conch. Man., ed. ii., p. 63 [not of Schumacher, 1817].
 1854. *Pomus* H. & A. Adams, Gen. Rec. Moll., i, p. 346 [not of Mus. Calonianum, 1797].
 1859. *Pomus* Chenu, Man. de Conchyl., i., p. 313.
 1883. *Pomus* Tryon, Struct. and Syst. Conch., ii., p. 276.
 1885. *Ampullaria* Fischer, Man. de Conchyl., p. 757 [*A. urceus* Müll.].

Section *Ceratodes* Guilding.

Type *Planorbis cornu-arietis* Lamarck, S. America.

1799. *Planorbis* Lamarck, Prodrôme, p. 76, [not of (Geoffroy) Müller, 1774].
 1801. *Planorbis* Lamarck, Système, p. 93.
 1828. *Ceratodes* Guilding, *Zool. Journ.*, iii., p. 537 [sole ex *H. cornu-arietis* Linné].
 1837. *Ceratodes* D'Orbigny, Voy. Amér. Mér., p. 335.
 1840. *Ceratodes* Swainson, Malac., p. 339.
 1842. *Ceratodes* Sowerby, Conch. Man., ed. ii., p. 204.
 1845. *Ceratoides* Catlow, Conch. Nom., p. 193; in syn.
 1854. *Marisa* H. & A. Adams, Gen. Rec. Moll., i., p. 347 [not of Gray, 1824].
 1859. *Marisa* Chenu, Man. de Conchyl., i., p. 314.
 1883. *Marisa* Tryon, Struct. and Syst. Conch., ii., p. 277.
 1885. *Marisa* Fischer, Man. de Conchyl., p. 757.

Section *Limnopomus* Dall, *nov.*

Type *Ampullaria columellaris* Gould, 1848, Peru.

Section *Pomella* Gray.

Type *Ampullaria megastoma* Sowerby, La Plata.

1847. *Pomella* Gray, *Proc. Zool. Soc.*, p. 148 [type *A. neritoides* D'Orbigny, 1837 = *A. megastoma* Sby., 1825].
 1853. *Pomella* H. & A. Adams, Gen. Rec. Moll., i., p. 348.
 1859. *Pomella* Chenu, Man. de Conchyl., i., p. 314.
 1883. *Pomella* Tryon, Struct. and Syst. Conch., ii., p. 276.
 1885. *Pomella* Fischer, Man. de Conchyl., p. 757.

Subgenus *ASOLENE* D'Orbigny.

Type *Helix plata* Maton, La Plata.

1837. *Asolene* D'Orbigny, Voy. Amér. Mér., p. 364.
 1838. *Asolena* Troschel, *Wieg. Arch. f. Naturg.*, 1838, ii., p. 279.
 1840. *Ampulloidea* D'Orbigny, Voy. Amér. Mér., p. 379.
 1842. *Ampulloid* D'Orbigny, Moll. Cuba, ii, p. 2.
 1846. *Asolena* Hermannsen, Index Gen. Malac., i., pp. 45, 84.
 1846. *Asolen* Agassiz, Nomencl. Index, p. 103.
 1854. *Asolene* H. & A. Adams, Gen. Rec. Moll., i., p. 349.
 1859. *Ampulloidea* Chenu, Man. de Conchyl., i., p. 314.
 1883. *Asolene* Tryon, Struct. and Syst. Conch., ii., p. 276.
 1885. *Asolene* Fischer, Man. de Conchyl., p. 757.

Genus LANISTES Montfort.

Type *Cyclostoma carinatum* Olivier, Africa.

1810. *Lanistes* Montfort, Conch. Syst., ii., p. 122 (*L. olivieri* Montfort. [The name does not occur in the Museum Calonnianum as has been asserted. Not *Lanistes* Swainson, 1840 = *Lanistina* Gray, 1847].)
1840. *Lanites* Swainson, Malac., p. 339 [*L. guineaica* Swainson].
1854. *Lanistes* H. & A. Adams, Gen. Rec. Moll., i., p. 349.
1859. *Lanistes* Chenu, Man. de Conchyl., i., p. 314.
1883. *Lanistes* Tryon, Struct. and Syst. Conch., ii., p. 277.
1885. *Lanistes* Fischer, Man. de Conchyl., p. 757.

Subgenus (?) MELADOMUS Swainson.

Type *Meladomus bulimoides* Swainson, Africa.

1840. *Meladomus* Swainson, Malac., p. 340.
1854. *Meladomus* H. & A. Adams, Gen. Rec. Moll., i., p. 349.
1859. *Meladomus* Chenu, Man. de Conchyl., i., p. 314.
1883. *Meladomus* Tryon, Struct. and Syst. Conch., ii., p. 277.
1885. *Meladomus* Fischer, Man. de Conchyl., p. 758 [*M. olivacea* Sowerby].

***Helix cantiana* Montagu at Tooting Common, Surrey.**—I am not able to trace that *Helix cantiana* has ever been set down as occurring at Tooting Common—that is actually in London, and within five miles of Charing Cross. As, however, it will in all probability sooner or later be reported from thence, I think that the fact, positively known to me, that it has (quite innocently) been introduced there recently, in 1901, should be placed on record. A young friend wrote to me, in 1902: "My colony of *Helix cantiana* on Tooting Common is flourishing." This was the first intimation I had of the matter, and I at once asked for particulars, explaining at the same time the scientific importance of placing them on record. My friend replied: "I did not realise what I was doing at the time. The snails were some that I brought from Hastings, and finding that I had more than were needed for my collection, not wishing to kill them unnecessarily, I placed them on the Common."—WILLIAM WHITWELL (*Read before the Society*, Sept. 9th, 1903).

Land Shells at High Altitudes.—During a visit to Switzerland this year we went for ten days to Arolla, at the head of the Combe d'Arolla, in the Canton Valais. The Grand Hotel Kurhaus, where we stayed, is situated in a pine wood, about 350 feet above the river, and an altitude of 6,850 feet above the sea. The pine wood only stretches for a short distance above the hotel, and as usual no shells were found in the wood, but just above the limits of the trees I found under stones *Hyalina radiatula* and var. *viridescens-alba*, *Conulus fulvus*, *Patula rupestris*, and *P. ruderata*, and also *Cionella lubrica*. These were all found at an altitude of 7,000 feet or over. During our visit we went one day for an excursion to the Lac Bleu de Lucel, and returning by the Cascade des Ignes, and from there up a very rough stone gully in the direction of the Aiguilles Rouges, we found four specimens of *Helix arbustorum* var. *alpicola* fully 7,500 feet or over. I have never before found shells at so high an altitude, and should be glad to know if they have been found higher than this in Europe.—EDWARD COLLIER (*Read before the Society*, Oct. 14, 1903).

A CONTRIBUTION TOWARDS
A LIST OF THE LAND AND FRESHWATER MOLLUSCA
OF BRECONSHIRE AND RADNORSHIRE.

By J. WILLIAMS VAUGHAN.

(Read before the Society, December 9, 1903).

As I have never heard of any attempt at an enumeration of the molluscan fauna of these inland counties, I thought that the following list of the species I have myself found might be of interest to members, especially as I find, on submitting them to the Recorder, that twenty-six are new records for Brecon and four for Radnor. The new records are indicated by an asterisk.

- **Vitrina pellucida* Drap. Velinnewydd.
- **Vitrea crystallina* (Müll.). Cwmbach Quarry, Llandefalley.
- **V. cellaria* (Müll.). Common in many places.
- **V. alliaria* (Miller). Common.
- **V. nitidula* (Drap.). Plentiful, Velinnewydd.
- **V. pura* (Alder). Near Velinnewydd—type and var. *nitidosa* Fér.
- **V. radiatula* (Alder). One specimen, Velinnewydd.
- **Euconulus fulvus* (Müll.). Cwmbach Quarry, Llandefalley.
- **Pyramidula rotundata* (Müll.). Everywhere.
- **Hygromia fusca* Mont. Near Pontyhatt, on road between Brecon and Hay.
- H. hispida* L. (= *concinna* Jeff.). Bronllys Castle and Llandefalley churchyard.
- **H. rufescens* (Penn.). Priors wall, Brecon.
- **Vallonia pulchella* (Müll.). Llangorse.
- **Helicigona lapicida* (L.). Talgarth.
- **H. arbustorum* (L.). Two specimens on road near Velinnewydd.
- Helix aspera* Müll. Talgarth, Bronllys and Llyswen.
- H. nemoralis* L. Common.
- H. hortensis* Müll. Common.
- **Ena obscura* Müll. (= *Bulinus obscurus*). Garden wall, Velinnewydd.
- **Cochlicopa lubrica* (Müll.). Llanvillo.
- **Jaminia cylindracea* (Da Costa). Llandefalley Rectory gardens.
- Clausilia bidentata* (Ström.) (= *rugosa* Drap.).
- **Succinea putris* (L.). Velinnewydd mill stream.
- **Ancylus fluviatilis* Müll. Velinnewydd brook.
- **Acroloxus lacustris* (L.). Llangorse Lake.
- Limnæa auricularia* (L.). Llangorse Lake.

- L. pereger** (Müll.). Common.
 Var. **maritima**. Llangorse Lake.
 ***L. truncatula** (Müll.). Velinnewydd.
L. stagnalis (L.). Llangorse Lake.
 ***Planorbis albus** Müll. Velinnewydd.
P. crista (L.) (= *nautilus* Lehm.). Llangorse Lake.
 ***P. fontanus** (Lightfoot). Llangorse Lake.
Bithynia tentaculata Leach. Llangorse Lake.
 ***Valvata piscinalis** Müll. Llangorse Lake.
 ***V. cristata** Müll. Llangorse Lake.
Anodonta cygnea (L.). Llangorse Lake.
Sphærium corneum (L.). Velinnewydd.
Pisidium amnicum (Müll.). Llangorse Lake.
 ***P. henslowianum** (Shepp.). Llangorse Lake.
 ***P. subtruncatum** Malm (= *fontinale* Jeff.). Llangorse Lake.
P. pusillum (Gmel.).

* * * * *

The following species I have so far only found in the adjoining county of Radnor:—

- ***Helicella caperata** (Mont.). Railway embankment near Erwood Station.
 ***Balea perversa** (L.). Skreen Darran.
 ***Planorbis contortus** (L.). Llanbuckbyn pool.
 ***Physa fontinalis** (L.). Llanbuckbyn pool.



The Type of *Cypræa caput-anguis* Philippi.—With a view of ascertaining whether the type of this species was really lost, I wrote to Dr. Philippi himself. His son kindly answered my enquiry as follows:—

“ Santiago, 15 Juin, 1902.

Monsieur !

Le type de *Cypræa caput-anguis* se trouve ici au Musée, faisant part de la collection de coquilles que mon père a vendu au Gouvernement de Chili il fait long temps, la même qu'il avait apportée d'Allemagne.

Votre très dévoué,

FEDERICO PHILIPPI.”

—L. ST. G. BYNE (*Read before the Society*, November 11th, 1903).

***Helix nemoralis* m. *sinistrorsum* in Switzerland.**—Whilst staying a few days at Corbeyrier sur Aigle, in July last, I found within one hundred yards of the Hotel Victoria a very fine specimen of the above, fully grown, and of the typical five-banded form. I also took most of the species that I found there in 1896, but in addition I got *Helix lapicida* and a fine series of *H. hortensis* vars. *incarnata* and *lilacina*.—EDWARD COLLIER (*Read before the Society*, Oct. 14, 1903).

THE SEVENTIETH BIRTHDAY OF HERMANN STREBEL**(Jan. 1st, 1904).**

(Read before the Society, March 9, 1904).

It is not in the least extraordinary for a man of affairs to devote his leisure to scientific study, but it is quite unusual for him to show such power that learned men who have made it their profession regard him as a distinguished authority. This is the case with our fellow conchologist, Hermann Strebel. When fifteen years old he went to Mexico and stayed there as a merchant until 1869, that is a period of twenty years. At Vera Cruz he became acquainted with Dr. Hermann Berendt, who introduced him to the delights of zoology and archæology, thus stimulating the scientific activity which, after his return home, Strebel at once began to exercise with all the activity of his nature. At first he turned his attention to working out his zoological collections. His book on the fauna of Mexico was finished in 1882, after six years' work; it ranks among the best and most detailed faunistic monographs, and gained for the author the undivided esteem of all contemporary authorities. The chief value of this book lies not so much in the fact that it increases our knowledge of Mexican zoology as in the scientific treatment of the subject, and in the statement and solution of many problems regarding form and colour to which his skill was peculiarly adapted. Another important feature is the demonstration of groups of forms, still in the course of transmutation, in accordance with our modern theory of evolution and with the recent discoveries of palæontology. All, this, together with a large number of illustrations, either photographed or drawn by the author, did much to recommend the book; it was, as Mr. Pilsbry, one of the first authorities, has said, "ahead of the times."

After the completion of this zoological work Strebel turned his attention to Mexican archæology, which he had been studying for some years. His writings on this subject are comprised in ten treatises containing 118 plates, the last of them is still in the press. The two volumes on Old Mexico and the more recent studies of ornaments and earthen vessels are the most important, though all are pre-eminent and have done more, perhaps, than the zoological works to mark Strebel's career as that of a great scholar.

Besides devoting himself to productive work he took a great interest in the scientific life of his native city. He was a permanent and active member of the Commission for the Natural History and Ethnological Museums; for thirty years, too, he has been one of the most energetic and respected members of the Natural Science

Association. Because of his scientific importance, and no less on account of his simple, straightforward nature, the people of Hamburg have been accustomed for years to look up to him as the senior member of the circle of naturalists. Very hearty and memorable expression was given to this esteem on his seventieth birthday, which was celebrated on January 1st this year. In the forenoon Dr. Melle appeared to present congratulations from the Senate, the School Authority and the Managing Committee of the Ethnological Museum. After him Dr. Wilhelm Spengel brought a diploma conferring on Mr. Strebel the honorary degree of doctor of philosophy in the University of Giessen. Diplomas and congratulations were received from a large number of other learned societies, the list of these runs as follows:—Leipziger Museum für Völkerkunde; the Anthropological Society, Washington; Sociedad científica “Antonio Alzate” in Mexico; Society of Naturalists in Basle; Société des Américanistes de Paris; the Conchological Society, England; the Anthropological Societies of Berlin and Vienna; and the Malacological Society, London. Congratulations were sent by the directors of the Museums in Berlin, Paris, Cambridge, Stuttgart, Lübeck and Manchester, also by the chief representatives of Ethnology and Malacology.

In the evening Dr. Strebel’s family and their nearest friends gathered round a hospitable board. The toasts were, at first, of a somewhat serious character, but a lighter tone was quickly introduced and sustained by some poems specially written for the occasion by Professors Seler, Schubert and Pfeiffer.

The Society’s address, for the text of which it is indebted to Mr. Edward Fiddes, M.A., was as follows:—

HERMANNO STREBEL

viro clarissimo atque doctissimo Societas Conchologica apud Britannos
Hibernosque instituta

Salutem dat

In nomine societatis nostrae quae tanti gaudii doctorum particeps esse vult tibi vir venerande gratulamur quod nunc annos septuaginta vitae tuae complexisti. Quis enim ignorat te multa ad incrementum scientiae contulisse, per multos annos per magnum laborem ad antiquitatem Mexicanam animum intendentem? Nec vero studia nostris simillima a te aliena sunt. Nam opera tua de conchis illius regionis, quae multas res antea obscuras illustrarunt, notissima sunt nec dum cura de hac parte naturae apud doctos manebit, tuum nomen ex memoria excidere patientur. Utinam per multos annos per annos felices vivas valeas scientiam augeas.

R. F. SCHARFF, *Præses*.

Kal. Jan., A.S., MCMIV.

GULIELMUS E. HOYLE, *Secretarius*.

To this the following reply has been received from Dr. Strebel:—

PAPENSTRASSE 79,
HAMBURG,

11, Januar, 1904.

HERRN WM. E. HOYLE

Secretär der Conchological Society of Great Britain and Ireland.

Hochgeehrter Herr!

Unter den vielen Ehrungen und Anerkennungsbeweisen, die mir gelegentlich der Vollendung meines siebenzigsten Lebensjahres dargebracht sind, hat mir die überaus freundliche und mich ehrende Begrüssung der Conchological Society eine besondere Freude gemacht. Ich bitte sie hochverehrter und lieber Herr Hoyle der Gesellschaft dafür meinen aufrichtigen und herzlichen Dank übermitteln zu wollen.

Ihr sehr ergebener,

DR. HERMANN STREBEL

PROCEEDINGS OF THE CONCHOLOGICAL SOCIETY OF GREAT BRITAIN & IRELAND

327th Meeting, January 13th, 1904.

Mr. Alfred Leicester in the chair.

Donations to the Library announced and thanks voted:

Papers on Italian Mollusca by Dr. Raffaele Bellini (*from the author*), and the usual periodicals received in exchange.

New Members Elected.

Fred Booth, 43, Victoria Road, Saltaire, Yorks.

Henry William Parritt, 8, Whitehall Park, Upper Holloway, London, N.

Candidates Proposed for Membership.

Thos H. Platt, 73, Clarendon Road, Manley Park, Manchester.

R. E. J. Stone, Asliffe, 78, Woodstock Road, Oxford.

Resignation.

W. D. Brown.

Member Deceased.

W. D. Crick.

The Hermann Strebel Celebration.

It was reported that notice had been received of the intention of various scientific associations to celebrate the seventieth birthday of the distinguished traveller, Hermann Strebel, of Hamburg, on January 1st, 1904, and that a letter of congratulation, signed by the President and Secretary, had been sent in the name of the Society. Dr. Strebel's reply was read to the meeting, and it was announced that the letter and reply would be published in the *Journal*.

Papers Read.

"Landshells of Majorca," and "Fish and *Paludestrina jenkinsi*," by the Rev. Canon Horsley.

"Note on *Petricola pholadiformis*," by Hugh Watson.

"*Dreissensia polymorpha*: Its Characters and Life History," by R. Standen.

Exhibits.

By Mr. C. Oldham: *Amalia gagates* var. *rava*, Dundalk, Co. Louth—on behalf of Mr. P. H. Grierson; and *Hyalinia lucida*, from near Plymouth—on behalf of Mr. L. E. Adams.

Many characteristic series of *Dreissensia polymorpha* from British and foreign localities were shown by Messrs. R. Standen and J. W. Jackson, together with many sets of local interest from the Manchester Museum, and from the Society's collections to illustrate Mr. Standen's paper.

near Lancaster, and from Chatham—the former being remarkably heavy and solid, although from the millstone grit formation—contrasted with the latter, from the chalk, which were unusually thin, almost approaching var. *tenuior* in texture.

By Mr. F. Taylor: On behalf of Mr. A. G. Stubbs—A set of water-colour drawings of varieties of British shells.

By Rev. L. J. Shackelford: *Strombus bubonius*, *Conus genuanus*, *Siphonalia buxea*, *Cypræa picta*, *C. lurida*, *C. spurca*, and series of Triton, Pecten, etc., all from Cape Verde Islands.

By Messrs. H. Beeston and C. E. Wright: A series of North-Devon mollusca to illustrate their paper.

By Mr. R. Standen: *Hyalinia (Polita) glabra* Studer, Switzerland (from the Crosse collection), compared with Whalley examples of *Vitrea rogersi* Woodward (from the Oldham collection), showing the specific difference most markedly; *Caracolina asturica* Mich. and *C. constricta* Boub., from Spain; *Trigonostoma holosericea* Stud., Switzerland; *T. diodonta* Muhlf., Servia; *Petasia bidens* Chem., from France; *Unio scobinata* Lea, Cambodia, and *U. spinosa* Lea, Southern States of America; *Vitrina (Semilimax) diaphana* Drap., from Trieste; and a living specimen of *Planorbis complanatus* m. *scalariforme*, from Didsbury.

A large series of *Limnæa palustris* was shewn from the "Oldham" and "Darbshire" collections in the Manchester Museum, the latter being especially rich in fine series of the very large specimens obtained by M. Hazay, near Budapest, Hungary. Local examples were shewn by various members.

329th Meeting, March 9th, 1904.

Mr. Edward Collier in the chair.

Donations to the Library announced and thanks voted:

"The Nudibranchiate Molluscs of Ballynakill, etc.," by G. P. Farran (*from the author*); and the usual periodicals received in exchange.

New Members Elected.

Miss A. L. Massy, 9, St. James Terrace, Malahide, County Dublin.

W. R. Sherrin, 38, Fielding Road, Chiswick, London, W.

Candidates Proposed for Membership.

Professor Raffaello Bellini, R. Scuola Tecnica, Chivasso, Turin.

George Hubbard Clapp, 325, Water Street, Pittsburgh, Pa., U.S.A.

Arthur H. Gray, 509, Exchange Buildings, Boston, Mass., U.S.A.

Frederick B. Jennings, 152, Silver Street, Upper Edmonton, London, N.

Thomas Taylor, 4, London Road, Blackpool.

Resignations.

The Rev. A. B. Kendig, D.D.

Mark Stirrup, F.G.S.

Paper Read.

An account of the celebration of the seventieth birthday of Hermann Strebel in Hamburg.

Exhibits.

By Mr. J. W. Jackson: *Fissurella volcano*, *Acmaea patina*, *A. scabra*, *A. scutum*, *A. pelta*, *A. spectrum*, *A. inessa*, *A. persona*, and *A. paliacea*; *Crepidula rugosa*; *Crucibulum spinosum*; and *Lottia gigantea*, from Californian localities.

By Mr. R. D. Darbshire: A fine series of *Pecten maximus*, from Brixham, shewing remarkable variation in colour of interior of shell, varying from pure white to deep purple red.

By Mr. R. Standen (on behalf of the Manchester Museum): (a), *Buccinum undatum* v. *flexuosum*, and a bi-operculate specimen of this species, from 90 faths. off Unst. Shetland; (b), a series of shells dredged from brackish water in Kiel

Bay, including *Astarte borealis*, *Cardium edule*, very small and thin, *Scrobicularia piperata*, *Tellina balthica*, *Saxicava rugosa*, *Dreissensia polymorpha*, *Mya arenaria* and *M. truncata*, very small and stunted forms of each, and a peculiarly dwarfed form of *Cyprina islandica*, not measuring more than 1.75 inches in length ; (c), an interesting series of thin-shelled, elongate, and highly-coloured *Cardium edule*, from Shurmish Kul, Jaman Klich, and Jaksi Klich, three large lakes formed by the drying up of the Aral Sea, where they have accustomed themselves to the brackish water, and occur in company with *Adacna vitrea*, *Neritina fluviatilis*, *Dreissensia polymorpha*, *Hydrobia ulvæ*, etc. ; (d), *Cardium edule* from Lake Mareotis, the Bitter Lakes, Suez Canal, Port Said, and the freshwater lakes at Ramleh, all shewing much variation from ordinary marine forms of cockle.

A large series of British Pectens was exhibited, including very beautiful sets shewing colour variation, from Hastings and Oban, and locality sets from many other places.

Special Exhibits at Future Meetings.

April 13th	-	The Genus <i>Aporrhais</i> .
May 11th	-	<i>Planorbis carinatus</i> and <i>P. umbilicatus</i> .
June 8th	-	The Genus <i>Pupina</i> .

Members are requested to bring or send specimens for comparison and discussion.

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The Nautilus, vol. 17, nos. 8-10, Dec. 1903-Feb. 1904.

"A new Californian *Trivia* [*T. ritteri*]," by W. J. RAYMOND. "Note on *Murex marcoensis* Sowerby," by F. C. BAKER [= *M. messorius*]. "New Land Snails from South America," by C. F. ANCEY [*Buliminus blanfordianus*, Iquico, Bolivia]. "A new *Scissurella* [*S. dalli*] from Patagonia," by PAUL BARTSCH.

"*Gundlachia* and *Ancylus*," by WM. H. DALL ["*Gundlachia* is merely an *Ancylus* which . . . has been able to form a calcareous epiphragm and survive the winter . . . and to secrete an enlarged and somewhat discrepant shell during its second summer."] "Structure of the Shell of *Unio*," by L. S. FRIERSON. "Land Shells of Mount Desert, Maine," by H. S. COLTON [lists from several localities]. "New Land Snails from South America," by C. F. ANCEY [*Bulimulus* 2 n.sp., *Odontostomus* 3 n.sp.]. "New Japanese Land Shells," by H. A. PILSBRY and Y. HIRASE [*Japonia toshimana*, *Eulota endo*, *Macrochlamys izushichitajimana* (!) *M. decens*, *Punctum infans*, *Kaliella sororcula*, nn.spp.].

"Shell Collecting Days at Frenchman's Bay," by DWIGHT BLANEY. "Observations on the Genus *Quadrula*," by L. S. FRIERSON [specimens found of several species with eggs in the gills]. "The Mollusks of Cedar Lake, Indiana," by F. C. BAKER [list of 15 spp.]. "A new Floridian *Amnicola* [*A. angustina*]," by H. A. PILSBRY. "Notes on the Nomenclature of the Pupacea and Associated Forms," by W. H. DALL [suggested by Mr. B. B. Woodward's "List of British Non-Marine Mollusca, *J. Conch.*, vol. 10, p. 354-5]. "Descriptions of new Japanese Land Shells," by H. A. PILSBRY and Y. HIRASE [*Eulota chishimana*, *Alycæus arawaensis*, *Succinea ikiana*, *Vertigo japonica*, *Nesopupa tamagonari*, nn.spp.]. "*Ancyli* adhering to Water Beetles," by C. W. JOHNSON.

La Feuille des Jeunes Naturalistes, nos. 399-401, Jan.-March, 1904.

"Les précurseurs des idées modernes sur l'origine des perles," by ALFRED GIARD. "Mollusques terrestres de la haute-vallée du Verdon (Basses-Alpes)," by E. MARGIER [22 spp. recorded]. "Le Laboratoire de Malacologie du Muséum," by L. JOUBIN.

"Sur quelques *Hélices Xérophiliennes* du groupe *Variabiliana*, recueillies aux environs de Dieppe (Seine-Inférieure)," by LOUIS GERMAIN.

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"Decalcification of Freshwater Shells," by R. WELCH. "Temporary Disappearance of *Paludestrina ventrosa*," by R. WELCH. "*Cecilianella acicula* in Ulster," by P. H. GRIERSON. "Marine Mollusca of Achill," by A. L. MASSY [16 spp., including *Volzella phaseolina* and *Modiolaria costulata* new to district].

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"On the Respiratory and Locomotory Habits of *Ampullaria globosa* Swainson," by V. V. RAMANAN. "The Anatomy of *Pharella orientalis* Dunker, and *Tagelus rufus* Spengler," by H. H. BLOOMER. "Otto Franz von Moellendorff," by Dr. W. KOBELT. "Some Notes on the so-called Appendix of *Helicella barbara* (L.)," by H. OVERTON [regarded "as a degenerate dart-gland rather than an appendix or mucous-gland."] "A Classified List of the Helicoid Land Shells of Asia" (part 8, conclusion), by G. K. GUDE. "On a small collection of Marine Shells from Surprise Island," by E. R. SYKES [list of 52 spp.].

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"Shore Collecting at Withernsea, etc.," by T. PETCH [*Lamellidoris aspera* new to district]. "*Arion ater* var. *albolateralis* Roeb., in North Lancs.," by S. L. PETTY.

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No. 3.

THE LAND SHELLS OF MAJORCA.

BY THE REV. CANON HORSLEY.

(Read before the London Branch of the Conchological Society on Jan. 8, 1904,
and before the Society on Jan. 13, 1904).

A FEW notes on the land shells of the little known Island of Majorca may be interesting, although the time I spent there—from Nov. 17th to Dec. 8th, 1903—seemed to coincide with helical preparations for hibernation, and as at the beginning of December some exceptionally cold rain and wind (for Majorca) occurred, no doubt some species hibernated earlier or more deeply than usual. In fact towards the end of my time *H. pisana*, *H. virgata*, *H. pyramidata*, and *H. splendida* were almost the only species to be found still on herbage or shrubs.

I was unable to obtain in London Dr. Hidalgo's list of the land shells of the Balearic Isles until after my return, and a letter to him from Palma elicited no reply, so that I had no guidance as to what species I might expect to find. I now find, however, that, writing in 1878, he describes seventy-two species of land shells as belonging to the Balearic Isles. Of these, however, twenty were not found in Majorca, thus reducing the number to fifty-two. It will be seen, however, that I can add two or three to his list. The majority of species are found on both sides of the Mediterranean, but fourteen

species are said to be peculiar to the Balearic archipelago. The affinity of all seems, as might be expected from the geological history of the islands, to be more Spanish than Italian, French, or Algerian. It is the section *Jacosta* of the subgenus and genus *Helicella* that is especially characteristic of the Balearic Isles.

Dr. Hidalgo's list is as under, those recorded from Majorca being marked Ma.:—

- | | |
|---|---|
| 1. <i>Limax variegatus</i> , Ma. | 37. <i>Helix boissyi</i> , Ma. |
| 2. <i>L. agrestis</i> , Ma. | 38. <i>H. caroli</i> , Ma. |
| 3. <i>L. majoricensis</i> , Ma. | 39. <i>H. apicina</i> , Ma. |
| 4. <i>Amalia gagates</i> , Ma. | 40. <i>H. conspurcata</i> , Ma. |
| 5. <i>Testacella haliotideae</i> , Ma. | 41. <i>H. costata</i> , Ma. |
| 6. <i>Succinea debilis</i> , Ma. | 42. <i>H. aculeata</i> . |
| 7. <i>Leucochroa candidissima</i> , Ma. | 43. <i>H. rupestris</i> . |
| 8. <i>L. cariosula</i> , Ma. | 44. <i>H. pygmaea</i> . |
| 9. <i>Helix aspersa</i> , Ma. | 45. <i>Hyalinia fulva</i> . |
| 10. <i>H. lactea</i> , Ma. | 46. <i>Hy. crystallina</i> . |
| 11. <i>H. punctata</i> , Ma. | 47. <i>Hy. nitida</i> . |
| 12. <i>H. vermiculata</i> , Ma. | 48. <i>Hy. lucida</i> , Ma. |
| 13. <i>H. graellsiana</i> , Ma. | 49. <i>Hy. balmei</i> , Ma. |
| 14. <i>H. balearica</i> , Ma. | 50. <i>Bulimus decollatus</i> , Ma. |
| 15. <i>H. minoricensis</i> , Ma. | 51. <i>B. quadridens</i> . |
| 16. <i>H. splendida</i> , Ma. | 52. <i>B. acutus</i> , Ma. |
| 17. <i>H. pisana</i> , Ma. | 53. <i>B. ventrosus</i> , Ma. |
| 18. <i>H. lanuginosa</i> , Ma. | 54. <i>B. solitarius</i> , Ma. |
| 19. <i>H. muralis</i> . | 55. <i>Achatina acicula</i> , Ma. |
| 20. <i>H. ebusitana</i> . | 56. <i>Ferussacia lubrica</i> , Ma. |
| 21. <i>H. cespitum</i> , Ma. | 57. <i>F. folliculus</i> , Ma. |
| 22. <i>H. variabilis</i> , Ma. | 58. <i>F. bourguignatia</i> . |
| 23. <i>H. lineata</i> . | 59. <i>Pupa polyodon</i> . |
| 24. <i>H. submeridionalis</i> . | 60. <i>P. granum</i> , Ma. |
| 25. <i>H. newka</i> , Ma. | 61. <i>P. umbilicus</i> , Ma. |
| 26. <i>H. majoricensis</i> , Ma. | 62. <i>P. minutissima</i> , Ma. |
| 27. <i>H. trochoides</i> , Ma. | 63. <i>P. codia</i> . |
| 28. <i>H. terrestris</i> , Ma. | 64. <i>Clausilia bidens</i> , Ma. |
| 29. <i>H. pyramidata</i> , Ma. | 65. <i>Truncatella truncatula</i> , Ma. |
| 30. <i>H. lenticula</i> , Ma. | 66. <i>Cyclostomus elegans</i> , Ma. |
| 31. <i>H. cardonæ</i> . | 67. <i>Tudora ferruginea</i> , Ma. |
| 32. <i>H. prietoi</i> , Ma. | 68. <i>Alexia myosotis</i> , Ma. |
| 33. <i>H. homeyeri</i> , Ma. | 69. <i>A. payraudeau</i> . |
| 34. <i>H. nyeli</i> . | 70. <i>A. balearica</i> , Ma. |
| 35. <i>H. ponsi</i> . | 71. <i>A. denticulata</i> . |
| 36. <i>H. pollenzensis</i> , Ma. | 72. <i>A. firmini</i> . |

There is no public collection of natural history objects in the island, nor could I hear of any private collector, though probably some exist. The island can roughly be divided into a large plain, highly cultivated, in which land shells would not naturally abound; very stony hills, bare but for a scanty growth of prickly and aromatic shrubs and scattered fir trees; and the mountains which are still more

bare of vegetation. Therefore, *prima facie*, it would hardly seem a 'snail' land. I may add that fowls, the great enemies of the collectors of land shells, abound. Therefore, especially in November, to "leave no stone unturned" is the conchologist's motto, and to search banks is not so lucrative. I found, however, what British experience would not lead me to anticipate, that young fir trees, about three feet high, were the favourite resort of two species, *H. pyramidata* and *H. splendida*.

I will now give a few notes on the species I found.

Helix aspersa is apparently the largest shell of the island, as I saw no trace of *pomatia*, though that was noted in Barcelona. It is invariably large, with a width of 1.75 inches. The only variety I noticed was var. *undulata*. It is eaten and sold in the market at Palma, but it did not seem to be very common. The shells, contrary to English use, seem rarely to become decorticated.

H. balearica.—Adult specimens were hard to find. Immature shells were more common, but might be confused with those of other species. One specimen I took on the battlements of the Lonja, an ancient building in Palma, and one in the garden below. Others on old olive trees inland.

H. splendida.—First found between La Puebla and Alcuida on shrubs and small trees, nearly always on young fir trees, rarely on others, and rarely more than one on a tree. They secrete much thin mucus, and the shells are found on cleaning to be much more delicate than their resemblance to *H. hortensis* would lead one to expect. The variety 00040 is more common than the type. Of ninety-seven gathered one day, forty-two were of this variety, which would seem as worthy of a varietal name as var. *tersoni*, which is simply (123)(45). The characteristic band grouping of the *Helices*, i.e., 1(23)45, was also common. I found four beautiful specimens pure white with transparent bands. Later, I found *H. splendida* by Porto Pi, on the lower parts of the hills. Here again it was hardly worth while to look for them except on young fir trees, which is curious considering how with us conifers are avoided by shells. One fine dark specimen like var. *tersoni* I found here, its banding being (123)45.

H. pisana was perhaps the most common shell, especially by the sea. Yellow and white varieties were more plentiful than the type, and the shells generally were finer than in England. Some were very broadly banded, but the var. *lineolata* was also found. Many of the common yellow forms were almost orange in tint.

H. lanuginosa was not very common. Covered with short hairs it is yet somewhat like *H. incarnata* which is, I think, hairless.

H. cespitum seemed local. It much resembles *H. virgata* but is larger and less common.

H. virgata (or *H. variabilis* to adopt the more sensible name of continental conchologists).—Whereas in England we are accustomed to find the type and the yellowish and the whitish (*albida* not *alba*) forms associated, and in about equal proportions, the type here seemed not so common, and var. *albida* hardly found. The well marked var. *radiata* I found both inland and by the sea. The commonest form was a greyish yellow with one or more brown zones or markings above the periphery. No forms were large and it seemed to be here of a decadent race.

H. caperata.—Two specimens seem to Mr. Edgar Smith to be *H. caperata*, but it is difficult to distinguish between this and *H. boissyi*, and Dr. Hidalgo is doubtful of its having been found in Majorca.

H. conoidea.—The same, I think, as Dr. Hidalgo's *H. trochoides*, is local. I first found it on the sea shore shrubs near Lagos de St^o. Ponsa, but afterwards, finer and much more well marked and varying, at Belver. They are beautifully marked little shells and vary very much. There is one curious variety in which all the shell except the white apical whorl becomes chocolate. It seems to bear somewhat the same relation to *H. acuta*, as regards marking, habits, etc., as *Vertigo* does to *Pupa*. The slightest touch makes them drop from twig or blade, so that I found it best to hold a glass tube under them into which they dropped on their support being touched. They much resemble the seed vessel of a plant on which they are often found. They were in copula on December 8th.

H. (Turricola) terrestris was plentiful, and finer inland than by the sea. Moquin-Tandon, I believe, makes the fasciated variety the type, and the uniformly grey shells var. *grisea*. Here, however, var. *grisea* prevailed, and any with dark bands were rare. I found one curious scalariform specimen.

H. pyramidata I found about Cas Catala. It looks like a pyramidal variety of *H. virgata* until the flat base and the absence of umbilicus is noted. I found it almost exclusively on young fir trees. It has its beautiful var. *radiata* like *H. virgata*.

H. lenticula was common under stones in comparatively damp places, *i.e.*, not much on the hills. It resembles our *Patula rotundata* but has not its markings.

H. prietoi is more easily distinguished by being strongly ribbed, especially on the lower side, and having a cristate keel.

H. ponsi I found sparsely under stones. It somewhat resembles *H. caperata*, but has a strongly marked keel.

H. boissyi is another of this group much resembling its congeners.

H. apicina was common on sandy places with low vegetation. I

am not clear that the series found at Belver Castle is the same as the larger form from other places in the island.

H. rupestris was plentiful on a limestone wall near Inca. The sandstone about Palma is probably too rough for it. This is not in Dr. Hidalgo's list for Majorca, though recorded from Minorca.

H. acuta is common almost everywhere, but was much smaller than in England. Adults seemed very few proportionately to the young of this year. These young ones, about the size of *Pupa secale*, I found clustered by hundreds on twigs of a hawthorn, looking like some disease of the tree. The variety *articulata*, and even var. *nigrescens*, I found at Belver Castle and elsewhere.

Leucochroa cariosula apparently hibernates early, for though dead shells were innumerable on rocky slopes near the sea, I found but few living specimens, and they all under stones. It forms a white paper-like operculum. The absence of a periostracum may cause specimens to be passed over as dead and bleached when they are not so.

Vitrea cellaria.—One specimen I found at Belver, but this was the only *Vitrea* I saw anywhere though turning over thousands of stones.

Stenogyra decollata was common on some hills under stones. I think it seemed to prefer a south aspect.

Ferussacia folliculus swarmed under stones, but was local. I found it more by waysides than elsewhere, and it probably requires more moisture than it would get on the steep and stony hills. It resembles *Zua lubrica*, but is larger and more acuminate, and the animal has a noticeable greenish yellow foot.

Pupa umbilicata I took from stones on the top of an old wall near Inca, but noticed none elsewhere. On the same wall I found two specimens of a small shell which I could not determine, acuminate, with six denticles, possibly it was *Pupa polyodon*.

Clausilia bidens var. **virgata** abounded everywhere. One day I counted sixty-one specimens under one stone about six inches by four. As far as I could see this was the only species to be found, though I expected others on the stony walls (hedger are unknown) and rocks.

Tudora ferruginea (called by some *Cyclostoma fulvum*) was common under stones by the sea and on the hills. It is of a warm purplish brown colour, but a clear yellow variety I found occasionally.

Shells of the **H. lucasi** group are the terror of collectors as such innumerable specific names are given to their varieties by continental conchologists. There seemed to me to be three species, distinct though of similar habits, form and markings.

1. **H. punctata**.—The largest and strongest, with a white lip.
2. **H. lactea**.—Lip and mouth generally dark brown or black. Called in Minorca "Monjas de boca negra."
3. **H. vermiculata**.—More globose, lip white.

All these were common, but began early to hibernate, though in places their young were active. These, with *aspersa*, are commonly eaten, and sometimes seen in the market of Palma. *H. vermiculata* is called in Majorca "Viudas" and "Caragolas," in Minorca "Monjas de boca blanca," and in Ivica "Vacas."

These are all I found during a diligent and daily search. Though November is the worst month in England, in Majorca it is the most pleasant as regards climate, and my daily expeditions, in a different direction each day, gave me the rest and invigoration I needed, and quite as many shells as I expected—thirty species in all.

I may add that, stopping a day at Cette in the south of France on my way home, I found *Zonites algirus* fine and active in the afternoon, and also *Helicella explanata* which was not found in Majorca, and I also noted that *H. aspersa*, which was commonly eaten, was no larger than in England.

As for fluviatile and marine shells, I took out a scoop on the chance of being able to collect freshwater shells, but I found that over the greater part of the island a river means a stony channel in which water occasionally runs, and I did not reach Alcuida where an old marsh has been drained and the river canalized. Here some forms of *Alexia* might have been found.

As regards marine species (with which I have a very slight acquaintance) the island's coast is so rocky, and the rocks are so washed by the sea, that beaches are rare and small. About three miles from Palma, however, there is a stretch of sand hills with a sandy shore. There is here a strip of beach made entirely of broken, comminuted and bleached shells. There are plenty of shells here, in some places they are washed into banks, but they are almost entirely bivalves of two or three species only, the most plentiful being *Cardium edule*, *Pectunculus violaceus* and *P. glycimeris*. Near here I found a remarkable raised beach, not many feet above the water, indurated to such an extent that I could not break off a specimen. This was full of shells, larger, of greater variety, and containing far more univalves amongst them, than the bay seems at present to produce.

On my way home, I found the sands at Cette a great treasury of shells and three trays full were the result of one afternoon's stroll. Here also in the market, and included amongst the hors d'œuvres at dinner, were living *Tapes aureus* and *T. decussatus* which seemed, with a clam, mussels, and oysters, to be popular food. I obtained

from one old woman's stall a remarkable series of two species of *Tapes* shewing great variation in colour and marking, which our British Museum was glad to receive. Many men were engaged in the estuary dredging for these with an arrangement of large iron teeth and a bag-net at the end of a heavy pole. At Cette there is the interesting and well equipped Marine Biological Laboratory maintained by the University of Montpellier. It contains an excellent aquarium, and I was surprised to find that I was about the first English visitor. The collection of shells is fairly large but quite devoid of classification.

Protective form or colouring is somewhat strangely rare amongst molluscs, wherefore you will be more interested in two dry stems and seed vessels of plants from Belver Castle, near Palma. On one I have put some *Helix conoidea*, on the other *H. acuta*, and you will observe how in colour and shape the shells resemble the dry seed vessels. The somewhat rare var. *nigra* of *H. conoidea* in which the shell is chocolate with the apex only remaining white much resembles small bird-droppings.



Report on the Droylsden Ramble.—A fair number of members met at Droylsden on Sept. 12 for this ramble, a few having come long distances in the hope of taking some of the more local freshwater shells that have been found in the district. We first visited the clay-pit near Cryer's mill, where Mr. J. W. Jackson and myself took very fine *Sphaerium pallidum* during the summer of last year, and were disappointed to find that owing to the tipping of earth in the pond the bed of muddy clay in which the *Sphaeria* flourished had been covered, only a few dead shells rewarding our efforts. Taking to the towing path of the canal we went on through Droylsden to the Fairfield Locks, examining the canal as we went along; *Paludestrina jenkinsi* was still flourishing, and a few specimens of *Physa heterostrophæ* and *Sphaerium pallidum* were taken; on nearing the locks search was made for *Paludestrina taylori* in its original locality but without success. From the locks we directed our course along the canal towards Guidebridge; with the exception of a few nice *Physa heterostrophæ* nothing of special note was found in this length until we reached the Guidebridge Spinning Co.'s cotton mill, here the water is very warm owing to the condensed steam, and *Planorbis dilatatus* swarmed on the walls just below the surface of the water; from this point to the junction of the Peak Forest Canal, the species occurred uninterruptedly along with the *Physa*, *Planorbis cornæus*, *P. albus*, *Limnæa stagnalis*, *L. peregra*, and *Bithynia tentaculata*; in the canal between the cotton mills at Ashton-under-Lyne, *Sphaerium cornæum*, *S. lacustræ* var. *brochoniana* and *S. pallidum* occurred; the former species in very great abundance. On reaching the junction of the Peak Forest Canal we visited the short arm of the canal on the Cheshire side of the River Tame and found *Paludestrina taylori* in numbers on the moss-covered walls, in company with *Bithynia tentaculata* and other common species of freshwater mollusca. During the ramble only one species of land mollusca *Hyalinia nitida* was found.—FRED TAYLOR (*Read before the Society*, December 9th, 1903).

THE LAND AND FRESHWATER MOLLUSCA OF ILFRACOMBE AND DISTRICT.

SUPPLEMENTARY LIST.

BY H. BEESTON AND C. E. WRIGHT.

(Read before the Society, February 10th, 1904).

HAVING spent part of August, 1903, in North Devon, we made the collection and study of the mollusca the chief object of our rambles, and have much pleasure in herewith recording the results of our researches.

In the Society's *Journal*, sixteen years ago (vol. 5, p. 181-183, April, 1887) appeared a list of the shells of this district, by Mr. J. R. le B. Tomlin, and to it we are indebted for localities of several species. We were quite unable to find some species mentioned by Mr. Tomlin in the spots indicated by him; either they had migrated, or died out, or our search was not sufficiently thorough, and consequently they were overlooked. We are also indebted to Mr. Fred Partridge, of Barnstaple, for localities of several species, which we were glad to be able to add to our lists (and cabinets). We have not consulted any other lists, which might have assisted in making this one more complete and comprehensive; if any such exist for the district explored by us—except that by Mr. Tomlin—we should like to say that this one may be considered as supplementary.

The immediate vicinity of Ilfracombe (including the village of Hele to the east) we searched quite systematically, and the number of species discovered was very considerable. These taken together with those from Mr. Tomlin's list, show the district to be fairly rich in mollusca. The terrestrial species predominate, however, the paucity of freshwater shells being caused by the lack of fresh water, streams and ponds being almost entirely absent. The slugs we did not feel particularly interested in, the species found being very few indeed, hence we are unable to make any addition to Mr. Tomlin's list, with the exception of varieties. Both *Helix nemoralis* and *H. hortensis* were abundant in places, especially the latter, and from the list it will be seen that we succeeded in finding most of the recorded and named varieties. Places visited outside Ilfracombe were:—Lee to West; Woolacombe, Braunton, and Braunton Burrows, to South-West; Barnstaple and Bishop's Tawton to South; Hele and Berrynarbor to East; Lynnton and Lynmouth to the East. It will thus be seen that the ground covered was rather extensive, and with the exception of Ilfracombe and its immediate neighbourhood, only very cursorily explored. There is very little doubt that if properly worked North Devon will compare very favourably with many other counties in the richness of its mol-

luscan fauna. We would commend it to the notice of other conchologists as ground which will repay exploration.

The geology of the district presents little variety, consisting chiefly of rocks of the Middle Devonian system, at and around Ilfracombe, passing into the Upper Devonian near Braunton, five or six miles to to the southward.

In the following lists, where we are indebted to other workers or their lists for species, the initials show the source from which the information is derived (J.R.B.T.) = Mr. J. R. le Brockton Tomlin, M.A.; (F.P.) = Mr. Fred Partridge. The various localities have been kept separate in order to facilitate future reference. Specimens of those species marked with * have been sent to the recorder for identification, and insertion in the Census List for Vice-County 4, North Devon, as they do not appear in the last Census, published in June, 1902, by Mr. L. E. Adams. The nomenclature followed in this paper is that of Mr. L. E. Adams, in "The Collector's Manual of British Land and Freshwater Shells," second edition. In the following lists varieties marked ? are not given in Mr. Adams' Manual, yet the shells are quite distinct and different from any of the others.

LIST OF SHELLS, VICE-COUNTY NO. 4, NORTH DEVON.

I.—ILFRACOMBE.

Arion ater (Linné).—Fairly common under stones, at foot of walls, and rubbish heaps in gardens. The black variety predominated, but the colour variation ranged from black through brown, slate, grey, to almost white, one or two specimens being nearly transparent, and very white.

A. hortensis (Férussac).—Common; "two albinos at Hele" (J.R.B.T.).

Amalia sowerbyi (= *marginata*) Férussac.—Common; "east side of Hele Bay" (J.R.B.T.).

Limax maximus (Linné).—Rare; "Combe Martin and Challacombe" (J.R.B.T.).

Agriolimax agrestis (Linné).—Common everywhere.

Testacella haliotide (Cuvier).—Mr. Tomlin records the finding of "four live specimens and one dead shell, under stones, buried deeply in the ground" at Hele Bay; long and diligent search was in our case quite unsuccessful.

Vitrina pellucida (Müller).—Occasional dead shells under leaves and among grass. "Alive at Hele, Watermouth, Combe Martin Widmouth, etc." (J.R.B.T.).

***Hyalinia draparnaldi** (Beck).—Found in small colonies at three places, viz.:—Braunton Road, Rapparee Lane, Quay Field

Lane, at the roots of nettles, and under stones at the foot of walls.

Being in doubt about the identification of this species, we submitted specimens to Mr. J. W. Taylor, who verifies them as *draparnaldi*.

Hy. cellaria (Müller).—Common, found with previous species. "Finest at Hele; some lovely (albino) specimens with the Testacellæ" (J.R.B.T.).

Hy. alliaria (Müller).—Not common; Berrynarbor Road, Raparee Lane, with *cellaria* and *draparnaldi*. "Hele, Combe Martin, Bittadon" (J.R.B.T.).

Hy. nitidula (Draparnaud).—Sparingly with *cellaria*. Mr. Tomlin says "equally common with *H. cellaria*," but this was not our experience.

Hy. pura (Alder).—"At Hele and Combe Martin" (J.R.B.T.).

Helix rotundata (Müller).—Fairly common under stones, at roots of nettles, and among decaying hedge-trimmings.

Var. **alba** (Moq.).—This variety predominated at Hele, as recorded by Mr. Tomlin. "Elsewhere the variety never occurred," but the shells were *not* "of the extremely fine size" he mentions, having evidently deteriorated in this respect, the largest not measuring more than six millimetres in diameter.

H. aculeata (Müller).—Woolacombe, Hele Bay (J.R.B.T.).

***H. pulchella** (Müller).—Scarce; one dead shell on wall near the harbour. "Occurred only twice on the cliffs between Ilfracombe and Lee (Torr's Walk)" (J.R.B.T.).

H. aspersa (Müller).—Type shells abundant in the hedges and stone walls in nearly all parts of the district, with few varieties.

Var. **nigrescens** (Moq.).—Two specimens of this variety found at foot of a wall among coarse grass. Both type and varieties were very thin, and approached the form *tenuior* (Shuttl.).

H. nemoralis (Linné).—Not abundant, but appearing to exist in small colonies in favoured localities, especially in hedges and walls, where the growth of ivy is thickest. Most of the shells were thin (as were *H. aspersa* and *H. hortensis*), semi-transparent and very beautifully coloured and banded. They occurred in the following places: (1) Berrynarbor Road (from Hele); (2) Combe Martin Road (beyond Hele); (3) New Barnstaple Road; (4) Torr's Walk (towards Lee).

Var. **rubella** (Moq.).—oooo (scarce), oo3oo (the commonest form except the type), oo3oo, oo3o₅, o₂3₃₄: The majority of these three forms are peculiarly mottled with red and white, and the third band is in most cases superimposed on a broader whitish sub-band, which gives the shells a very beautiful appearance (localities 1, 2, 3, 4, above).

Var. **rubella-roseolabiata** (Taylor).—Three specimens only, (localities 1, 3, 4).

Var. **rubella-roseozonata** (Cockerell).—Two specimens only, (locality 3).

Var. **libellula** (Risso).—This variety is not strictly yellow, but tends to orange, and with the broad third band (00300) forms a very handsome shell. Forms 00000, 00300, 00300 (localities 1, 3, 4).

Var. **castanea** (Moq.).—"A single immature shell (00000)" (J.R.B.T.).

Var. **bimarginata** (Moq.).—Two or three specimens only (localities 1, 3, 4).

Var. **conica** (Pascal).—One specimen only, (00300); locality 2.

Var. **tenuis** (Baudon).—Many of the shells were thin and semi-transparent. The following variations of type-bandings of shells were noted:—123(45), 12345, 12345, (12)3(45), (12)33345, (33 only begin in middle of last whorl), (123)(45).

Band variations in this and the next species are according to Mr. L. E. Adams' formula.¹

It will be seen that there are six distinct varieties of this species, and no less than twelve forms of bandings.

H. hortensis (Müller).—Very common in most places, much more so than *H. nemoralis*. It occurred in almost every hedge-row, the var. *lutea* always predominating. It was almost always associated with *H. nemoralis*, and the two seemed to live indiscriminately together, although in one or two localities only *H. nemoralis* was found.

Var. **lutea** (Moq.).—Ubiquitous.

Var. **albina** (Moq.).—Next to *lutea*, this variety was commonest, 103(45), 1(23)45.

Var. **minor** (Moq.).—Only an occasional specimen.

Var. **roseolabiata** (Taylor).—One specimen (locality 2). This shell was rather peculiar, and can only be fully described as *albina-roseo-labiata-conica*.

Var. **roseozonata** (Cockerell).—Scarce (localities 1, 2).

Var. **arenicola** (MacGill).—Rare; found in two places only (locality 1 and village of Slade).

Var. **conica** (?)—Rare; very tumid, with high spire.

Var. **depressa** (?)—Nearly all the var. *albina* had depressed spires.

Var. **olivacea** (Taylor).—One specimen only (locality 4).

Var. **bimarginata** (?)—One specimen only (locality 4).

¹ See his "Manual of British Land and Freshwater Shells," p. 67.

Var. **citrinozonata** (?)—A beautiful shell with transparent yellow bands, but scarce, and found only in one spot (locality 1).

Var. **tenuis** (Baudon).—Common; in fact most of the shells were thin, but some more so than others.

Var. **luteolabiata** (L. E. Adams).—Three specimens. In this species forms of banding were many and extremely variable. Band variations: 12345 (type), (12345), 1(2345), (123)(45), 1(23)45, 12345, 1:345, 123(45), (12)3(45), 12345, 12345, (12)345, 10345, ::345, 0:345, :::4:, 00345, 103(45), 1(23)45.

H. rufescens (Pennant).—Not common anywhere; one or two small colonies at varying distances apart.

Var. **alba** (Moq.).—Scarce. (Braunton Road, Berrynarbor Road, Rapparee Lane). "Hele, Combe Martin Road" (J.R.B.T.).

Var. **albo-cincta** (Cockerell).—Scarce. (Braunton Road, Rapparee Lane).

Var. **rubens** (Moq.).—Rare; (Berrynarbor Road, Rapparee Lane).

***H. hispida** (Linné).—Not common; "Sparingly, but widely distributed" (J.R.B.T.).

Var. **depilata** (Alder).—Only found in one locality (Braunton Road), "on east side of Hele Bay" (J.R.B.T.).

Var. **albida** (Jeff.).—"A single adult on the Combe Martin Road" (J.R.B.T.).

***H. granulata** (Alder).—Not by any means common, only one small colony noted, near Ilfracombe, viz.: at foot of wall skirting Rapparee Lane among nettles and herbage in the immediate vicinity of Ilfracombe. At Berrynarbor an exceptionally large colony, consisting of many thousands was discovered. So thickly crowded together were the animals, that every plant stem, every leaf of ivy and bit of available vegetation was crowded with them, and in some places the snails were crawling over each other. They were also of very fine size.

"Decidedly rare; it occurred at Widmouth Cove, Hele, and elsewhere" (J.R.B.T.).

***H. fusca** (Montagu).—Very rare; two live specimens among herbage on Berrynarbor Road, and one other live one in Chambercombe Woods. "One live and one dead shell under stones in Combe Martin Village" (J.R.B.T.).

H. virgata (DaCosta).—Decidedly absent in the immediate vicinity of Ilfracombe. The nearest colony found was at Lee, two miles to the west, and another "on the slopes of 'Little Hangman'," (J.R.B.T.) to the east.

Var. **hypozona** (Moq.).—"Little Hangman" (J.R.B.T.).

Var. **albicans** (Grat.).—"Little Hangman" (J.R.B.T.).

Var. **subalbida** (Poiret).—"Little Hangman" (J.R.B.T.).

Var. **lutescens** (Moq.).—Found with the type at Lee.

H. caperata (Montagu).—Common on the grassy slopes of Hele Bay, but small, approaching var. *minor*. "Finest on the 'Hangman'" (J.R.B.T.).

Var. **ornata** (Pic.).—Found with the type, "at Combe Martin" (J.R.B.T.).

Var. **obliterata** (Pic.).—One dead shell.

Buliminus obscurus (Draparnaud).—Not common as far as our experience went, Mr. Tomlin observes, "common in hedgerows on the road to Combe Martin; also plentiful in Hele Bay locality." Possibly only a matter of more diligent search.

***Pupa cylindracea** (DaCosta).—Common under ivy on top of old walls, and at roots of grass in fairly dry situations. "Ubiquitous and generally very fine indeed" (J.R.B.T.).

***Vertigo moulinsiana** (Duprey).—See below under Braunton Burrows.

***V. pygmæa** (Draparnaud).—See below under Braunton Burrows.

Balea perversa (Linné).—Rare; one living specimen among ivy in Chambercombe Woods. "A single live specimen in a copse south of Bittadon on slate" (J.R.B.T.).

Clausilia bidentata (Ström).—Found very plentiful at foot of stone walls in damp situations; also among moss. "Plentiful everywhere" (J.R.B.T.).

Var. **tumidula** (Jeff.).—One specimen in Rapparee Lane. "A swollen and stumpy form, corresponding to this variety occurred near the sea" (J.R.B.T.).

***Cl. laminata** (Montagu).—One live shell only of this species found, but exact locality uncertain, in all probability Chambercombe Woods.

Cochlicopa lubrica (Müller).—Not very common anywhere; single specimens found under stones in damp situations (Berrynarbor Road). "Coombe Martin, Hele and Ilfracombe" (J.R.B.T.).

Carychium minimum (Müller).—"Plentiful with *H. rotundata* var. *alba*" (J.R.B.T.). Not a single one rewarded our search, however.

Cyclostoma elegans (Müller).—"Also common in the Hele locality; not found elsewhere. Most of the specimens were of a dark purplish colour" (J.R.B.T.). Not even a dead shell did we discover, although diligent search was made for this species, both in the locality named and in other places.

***Succinea putris** (Linné).—Among rushes in damp spots on the sides of the river Wilder to the south of the town.

Limnæa peregra (Müller).—Scarce, and small in size. Three or four live shells found in a small spring near Rapparee Lane.

L. truncatula (Müller).—Common, but small; found with *L. peregra*. Also in Chambercombe Valley, and in damp ditches and puddles around the springs in various places outside the town.

The following short lists were the result of day excursions to the places named, and may serve as nuclei for further search.

II.—MORTHOE AND WOOLACOMBE (South-west).

Helix aspersa (Müller).—Chiefly type shells.

Var. **exalbida** (Menke).—One half-grown shell and one full-grown specimen, found on a stone wall near Woolacombe.

H. nemoralis (Linné).—Common, type bandings (*rubella*) 12345, 12345.

Var. **libellula** (Risso).—Chiefly 00300, 00000 (one specimen).

Var. **libellula-bimarginata** (Moq.).—One specimen.

Var. **rubella** (Moq.).—00300, 00000, 00340, 003:0, :030.

Var. **roseozonata** (Ckl.).— } 00300, combined in same shell

Var. **roseolabiata** (Taylor).—/ (one specimen).

III.—LEE (TO WEST).

Helix hortensis (Müller).—Common, chiefly type shells (12345) and var. *lutea*.

H. virgata (DaCosta).—Rather local and not very common.

Var. **alba** (Picard).—Found with the type in the lane leading to Torrs' Walk from Lee towards Ilfracombe, chiefly on stone walls and herbage, etc.

Var. **lutescens** (Pascal).—Fairly numerous.

H. rufescens (Pennant).—Type.

Limnæa peregra (Müller).—Few and small.

Ancylus fluviatilis (Müller).—Not common.

IV.—BRAUNTON AND BRAUNTON BURROWS (TO SOUTH-WEST).

Helix aspersa (Müller).—Common.

H. nemoralis (Linné).—Common (12345).

Var. **rubella** (Moq.).—00300, 02300 (with white sub-band).

Var. **libellula** (Risso).—00000.

Var. **albina** (Moq.).—00000, 00300.

Other bandings (in *rubella* and *libellula*) (123)(45), 123(45), (12)3(45), 12345, (12345).

Var. **bimarginata** (Moq.).—Scarce.

The *H. nemoralis* are all well-grown, strong, fine shells, and are found inhabiting the clumps of thick marram grass and moss.

H. hortensis (Müller).—Not so common as *H. nemoralis*. The two species were not found together, as was the case at Ilfracombe.

Var. **lutea** (Moq.).—One specimen.

Var. **arenicola** MacGill.—One specimen.

Var. **fuscolabiata** (Von Martens).—One specimen.

Bandings .00345, ₁₂345, (12)345, 10345, 12345.

H. virgata (DaCosta).—Common; thousands of dead and bleached shells were scattered about on the sand, mixed with *H. hortensis*, *H. nemoralis*, *H. aspersa*, *H. acuta*, etc.

Var. **albicans** (Grat.).—One specimen.

Var. **roseozonata** (?)—One specimen.

Var. **subscalaris** (?)—One specimen.

H. acuta (Müller).—Extremely common; these snails must at times fairly swarm, as dead shells lie about among the sand in countless numbers.

H. caperata (Montagu).—Ubiquitous.

Var. **ornata** (Picard).—Ubiquitous.

H. rufescens (Pennant).—(F.P.).

***H. pulchella** (Müller).—

Cochlicopa lubrica (Müller).—Very common.

***Pupa cylindracea** (DaCosta).—

Var. **albina** (Moq.).—One specimen.

P. muscorum (Linné).—

Var. **albina** (?)—One specimen.

***Vertigo moulinsiana** (Duprey).—Fairly common in damp ditches on grass stems and rushes. (For the locality of this rare shell we are indebted to Mr. F. Partridge, Barnstaple).

V. pygmæa (Draparnaud).—Several dead shells found among debris blown about by the wind, and collected into "pockets" on the lee-side of tufts of grass, etc.

Hyalinia cellaria (Müller).—Fairly common in damp spots.

Hy. nitidula (Draparnaud).—Fairly common in damp spots.

Hy. alliarda (Müller).—Common.

***Hy. nitida** (Müller).—Scarce.

***Hy. fulva** (Müller).—One specimen.

From the dykes near the "Burrows" the following freshwater shells were obtained:—

Limnæa peregra (Müller).—Common.

***L. palustris** (Müller).—Common.

***Sphærium corneum** (Linné).—Common, but small.

***S. lacustre** (Müller).—Scarce.

***Planorbis albus** (Müller).—Fairly common

***P. spirorbis** (Müller).—Not common.

Succinea putris (Linné).—Small.

S. elegans (Risso).—Small.

***S. oblonga** (Draparnaud).—This rare shell's habitat was some time ago rediscovered by Mr. Fred. Partridge, of Barnstaple (to whom we are much indebted for kindly showing us the locality, and not only for this shell but for other uncommon species). We say *rediscovered* advisedly, because Dr. Jeffreys recorded the shell from Braunton Burrows (see "British Conchology," vol. 1). He says, "I have found it among the sand hills on Crymlyn Burrows, near Swansea, and in a similar situation on Braunton Burrows" (p. 154).

Var. **arenaria** (?) (Bouchard).—Most of the shells seem to be of this form, being thick and very deeply coloured.

Var. **alba**.—One live shell, which was exhibited at the Society's meeting held on Dec. 9th, 1903.

Limnæa truncatula (Müller).—

Var. **elegans** (Jeff.).— } Common on the damp sand in
partially dried-up water-pans in
company with *S. oblonga*.

***Psidium fontinale** (Draparnaud).—Common.

***P. milum** (Held).—Common.

***P. pusillum** (Gmelin).—Common.

V.—LYNTON AND LYNMOUTH (to the East).

Helix nemoralis (Linné).—Common.

Var. **rubella** (Moq.).—00300, 12345, (12)3(45), 00000.

This variety (00300) has in many cases a beautiful white sub-band upon which the dark third band seems to be superimposed, which give the shells a very handsome appearance.

Var. **libellula** (Risso).—00300, 003300.

Var. **bimarginata** (Moq.).—00000.

Var. **castanea** (Moq.).—00000 (one specimen only).

Var. **tenuis** (Baudon).—Most of the shells are very thin, and required care in extracting the animal.

H. hortensis (Müller).—Common.

Var. **lutea** (Moq.).—Very common (00000). } Bandings
12345, (12345).

Hyalinia alliaria (Miller).—A few.

Hy. cellaria (Müller).—A few.

Helix rotundata (Müller).—Common.

Var. **alba** (Moq.).—Local, but plentiful where they occur (F.P.).

***H. hispida** (Linné).—Fairly common, the variety *depilata* (Alder) occurring occasionally.

***H. fusca** (Montagu).—Not common, an odd live one here and there.

H. virgata (DaCosta).—Small colony on herbage near railway station.

H. lapicida (Linné).—Very common on stone walls after rain.

Var. **albina** (Menke).—The percentage of this variety worked out $3\frac{1}{3}\%$.

Buliminus obscurus (Müller).—Not very numerous.

***Pupa cylindracea** (DaCosta).—Extremely common on stone walls with *H. lapicida*.

Clausilia bidentata (Strom).—Ubiquitous.

Var. **tumidula** (Jeff.).—A few found with type.

VI.—BARNSTAPLE (TO SOUTH).

Helix aspersa (Müller).—Type, fairly common.

Var. **undulata** (Moq.).—One or two shells only.

H. nemoralis (Linné).—

Var. **rubella** (Moq.).—00300 (one specimen). Also at Bishop's Tawton.

H. hortensis (Müller).—Fairly common.

Bandings 00300 (rare form), 12045, ::345, 1:345, 12345.

H. rufescens (Pennant).—Fairly abundant.

Var. **alba** (Moq.).—One specimen.

H. virgata (DaCosta).—

Var. **alba** (Taylor).—Along left bank of river Taw.

***H. granulata** (Alder).—Plentiful, but local, of very fine size.

***H. hispida** (Linné).—Common.

Var. **depilata** (Alder).—Odd specimens.

Var. **albida** (Jeff.).—One specimen found with *H. fusca*.

***H. fusca** (Montagu).—Not abundant; very fine specimens found near Anchor Wood.

H. arbustorum (Linné).—Scarce; found near Anchor Wood.

***Succinea elegans** (Risso).—Found in wet ditch at foot of Anchor Wood.

***S. putris** (Linné).—Found in wet ditch at foot of Anchor Wood.

Limnæa peregra (Müller).—Found in wet ditch at foot of Anchor Wood.

***Aplexa hypnorum** (Linné).—Found in wet ditch at foot of Anchor Wood.

***Planorbis vortex** (Linné).—Found in wet ditch at foot of Anchor Wood.

***Unio margaritifer** (Linné).—Common in river Taw at New bridge near Bishop's Tawton.

***Paludestrina jenkinsi** (Smith).—Found in vast numbers on the mud and weeds of river Yeo; so thickly clustered together are

the shells that at low tide, for some distance from the side, they are quite half-an-inch deep, and make the water appear quite black. None of the shells are carinated.

In Twiss and Son's Illustrated Guide to Ilfracombe is printed a list of shells of the neighbourhood, taken from Gray's edition of Turton's "Manual of Land and Freshwater Shells." This list contains sixty-two species, some of which are questionable records. The following are a few of the most doubtful ones:—*H. cantiana* (Montagu), *H. pisana* (Müller) (locality given: a sandhill at Woolacombe), *H. itala* (Linné), *Limnæa auricularia* (Linné), *Neritina fluviatilis* (Linné).



The British Species of Vallonia.—Since the "List of British Non-Marine Mollusca" (*J. Conch.*, vol. 10, p. 352) was written Dr. H. A. Pilsbry kindly sent me more examples of the American species identified by Dr. Sterki with *Vallonia costata* (Müll.). In these, which were well preserved, the striæ on the nucleus could be clearly made out under an one-inch objective with a good light. A re-examination of my own series soon showed that I had been unfortunate in not having such well-preserved specimens as I thought and unwise in expecting a more pronounced sculpturing. Through the kindness of Mr. J. H. Ponsonby I have been able to inspect, at my leisure, his whole collection of this genus and I am now satisfied that *Vallonia costata* (Müller) is a valid British species. Worn specimens of *V. costata* and casual examples of *V. pulchella* mislead me into thinking that linking-forms existed. Moreover, it proves on investigation that *Vallonia excentrica* Sterki, is, as its founder pointed out (*Proc. Acad. Nat. Sci. Philad.*, 1893, p. 278) widely distributed in Great Britain, and is easily recognised when once its difference from *Vallonia pulchella* (Müll.) has been noted. *V. excentrica* was originally described (*op. cit.*, p. 252) as follows:—"Shell of medium size, with major diameter markedly longer, and with irregular, somewhat elongated umbilicus, at first rather narrow, then for the last $\frac{1}{2}$ whorl rapidly widening; slightly rounded convex above, smooth or very finely irregularly striate, strongly and regularly at the umbilicus; nucleus smooth; pale horn colored, transparent or slightly opaque, with a somewhat faulty gloss; whorls $3\frac{1}{2}$, rather rapidly increasing with a moderately deep suture, the last comparatively large, well rounded, expanding near the aperture, not descending, or very little at the suture, aperture moderately oblique and inclined, $\frac{5}{8}$ circular, subangular at the base; the umbilical margin somewhat protracted; peristome not everted above, very little at the periphery and moderately below, with a rather strong white lip, thinner at the ends, visible through the shell. Diam.: maj. 2.3, mm. 1.8, alt. 1.1 mm." The umbilicus in *V. excentrica* is not only eccentric as contrasted with that of *V. pulchella* but it is less open, and the sutures of the whorls within are more impressed. There are therefore three species of *Vallonia* in the British Islands, that have hitherto all passed under the name of *V. pulchella* (Müll.). From a preliminary inspection of the material in my collection it is apparent that all three also occur in the fossil state.—B. B. WOODWARD (Received December 12, 1903, and read before the Society, April 13, 1904).

THE ZEBRA-MUSSEL (*Dreissensia polymorpha* Pallas).

BY R. STANDEN.

(Read before the Society, January 13, 1904).

OF all our British non-marine mollusca I consider the "Zebra-mussel" second to none in the peculiar interest attaching to its rapid distribution and life-history. A brief resumé of what is known on the subject may be useful to those members who are not fully cognizant of it, and will, I hope, give some additional interest to the special exhibition of *Dreissensia* shewn at this meeting.

During the later Tertiary times *Dreissensia* was well distributed over Europe, and seems from some unknown cause to have died out, but during the past two centuries it has partially regained its position by migration from its original habitat, the Caspian Sea. It first appeared in this country in 1824, and there is very conclusive evidence to hand of its being a foreign importation—probably from Germany.

With its general geographical history I do not propose to deal, and shall only touch upon its local distribution in Lancashire and Cheshire, as ascertained from various authors, local collections, and my own experience. Those who desire fuller information may refer to the appended list of the principal authorities I have consulted, and more especially to Wallis Kew's admirable work on the "Dispersal of Shells" ('93); this writer quotes exhaustively from many out-of-the-way sources, and gives the authors' opinions as to the causes to which the rapid dispersal of *Dreissensia* throughout this and other countries may be attributed, and the ingenious theories propounded by the earlier conchologists to account for it. The first Lancashire record I can find is by Captain T. Brown ('44), who states that it was common in the Bridgewater Canal. David Dyson ('50) found it existing in great numbers in a reservoir at Beswick, covering the embankment stones at about three feet deep. He was led to investigate the reservoir by the discovery of the shells in the large old-fashioned stone pipes then used to convey the water to Manchester. It was found that these pipes, specimens of which may now be seen placed as curiosities in most of our public parks, had become so choked with the shells as to seriously diminish the volume of water and interfere with the supply, and it was almost an impossibility to clean them out. In spite of the absolute darkness in which these shells lived and thrived, they were unusually well marked and brilliantly coloured. Then we come to the late Mr. John Hardy's record ('65):—"Old brick pits, Longford; and canals at Reddish and Bolton." The late Mr. Thomas Rogers found it, about the same date, very common in the Bardsley Canal;

and Mr. R. D. Darbishire has it from the old reservoir at Bradford (near Manchester), and from the canal at Hatherlow. Mr. J. R. Hardy has in his collection specimens from a reservoir at Gorton, where it was, some years ago, very plentiful, but has since died off owing to the fouling of the water; also from "Ardwick Pond" where it covered the stones and piles, but this locality is, like some others of those already mentioned, long ago a thing of the past and quite "historic."

My first acquaintance with this shell dates from 1878, when I came across numbers of very small but well-marked specimens in the River Brock, attached to large stones. The following year I discovered it in abundance on the sides of bridges all along the Preston and Lancaster Canal—which, for the greater portion of its length, is the cleanest canal I know. Whilst collecting along the banks of this canal I have several times come across little heaps of freshly gnawed shells of *Dreissensia* amongst the herbage, close to the water's edge, and believe this to be the work of water voles—the only instance I know of this mussel being preyed upon by any animal. From this canal came my finest and most treasured series, collected by my wife at Woodplumpton, in 1888. These are remarkable for their curious and varied abnormality. Some are broad and flat, rounded and bulged posteriorly; others seem to have had—when about half-grown—both valves opened to their fullest extent and fixed there, the gap being afterwards filled up, more or less regularly, with a secondary growth which has left the old edges of the shell projecting as a frill or flange; others, again, are almost globular, or shaped like a beech-nut. As a rule these abnormal specimens are in good condition, even the secondary growth being perfect as to epidermis and coloration. I have never been able to account for the protean shapes assumed by the shells from this locality during this particular season—the colour and markings, too, were unusually vivid in old and young, normal and abnormal alike, much more so than I have ever observed before, or since. One can well imagine that Pallas had some such series of specimens before him when he bestowed the specific name!

From 1887 onwards I obtained *Dreissensia* from Cadley Dam, Preston; canals at Tarleton, Droylsden, Ashton-under-Lyne, Clifton, and Ringley; and from a reservoir at Lowerhouse Printworks, Burnley, where it abounds in thousands on submerged tree-roots. In some of the localities named the increasing pollution of the canals near the towns is gradually killing off the *Dreissensia*, and where it still survives under such adverse conditions it is difficult to find even a half-grown specimen in fairly good condition—the adults are so eroded and stunted as to be almost shapeless. Mr. B. R. Lucas finds it abundantly in canals at Chester and Middlewich; and Mr. C. Oldham

reports it from the Shropshire Union Canal near Beeston Castle; from the Grand Trunk Canal at Lostock Gralam; and the Peak Forest Canal at Marple. In 1863 Mr. Leo H. Grindon found it swarming in the lodges of some print works at Handforth, where it caused great inconvenience by lining the inside of the water-pipes, but Mr. Oldham could only find a few dead shells there when he visited the place in 1887. Mr. J. W. Jackson found quantities of dead shells in the canal near Poynton, last year, but failed to discover any living ones on such portions of the walls as were accessible. Byerley ('53) and Bellars ('58) both, in their Cheshire lists, record *Dreissensia* from the Ellesmere Canal.

At the Annual Meeting of the Conchological Society held at Stafford in 1899, Mr. W. Wells Bladen exhibited a shell of *Dreissensia* containing a pearl, taken from the canal near Rugely. The pearl is attached, almost spherical in shape, and has a small protuberance at one side; it is 2 mm. in diameter, and is very fine in colour. This is the first recorded instance of a pearl being found in this mollusc.

Dreissensia is apparently so nearly allied in form to *Mytilus* that it is not surprising the question should have been raised as to whether it is not a marine form which has gradually accustomed itself, as other estuarine species have been known to do, to an admixture of fresh water, and ascended the streams until it became completely habituated to it. This explanation is probably true, for we find that it is reported as still living amongst marine mussels in the Aral and Caspian Seas, and the estuary of the Volga; in both these situations it is, however, only found in such parts as are much impregnated with fresh water. Notwithstanding this instance of its retention of a semi-marine habit we may safely assume that it is now a true freshwater mussel, and consequently its development, so widely differing—as I shall presently shew—from all other freshwater Pelecypoda, is deeply interesting.

The mystery attending the long unknown reproduction and early life history of *Dreissensia* has been satisfactorily elucidated by Dr. Korschelt ('92), and when his paper on the subject came into the hands of the late Professor A. Milnes Marshall, he was much interested in it, and under his directions I commenced a series of observations with a view to following out those made by Dr. Korschelt, and, if possible, adding a little thereto. I procured a large quantity of healthy *Dreissensia* from the clean waters of the canal at Newsham, near Preston, bringing them away in situ on stones, etc., and placed them in a number of tanks brought as near as might be to the conditions under which the mussels had lived. They did very well in these aquaria, and were interesting creatures to watch, but I think we began too late in the season. However, our observations, so far as they went, coincided with Dr. Korschelt's, and we proposed to go

on with them the following year, commencing earlier, but the untimely death of Prof. Marshall put an end to the project, and I have not since had an opportunity of going further into the matter—systematically at any rate.

Development by means of pelagic larvæ provided with a velum is generally characteristic of marine Pelecypoda, but not of freshwater forms. *Sphærium*, *Pisidium*, and kindred genera develop their eggs in brood pouches within the gills of the parent, until the formation of the perfect animal is almost complete, and the young have already assumed the adult form on leaving the parent. The ova of the Unionidæ also develop in the gills, and when the larvæ are expelled therefrom they have become so far developed, and furnished with shells and shell-hooks, as to enable them to attach themselves to the fishes upon which they live parasitically for a time—but they possess nothing in common with the free-swimming larvæ of *Ostrea*, *Mytilus*, and other marine forms.

The ova of *Dreissensia* are deposited about the middle of June. They are remarkably small, with a scanty supply of yolk, and have an extremely delicate envelope. The mussel during oviposition slightly opens the valves of its shell and by snapping them quickly together ejects a tiny ball of ova. This process is repeated at intervals and may readily be observed in the aquarium. The balls of ova, which look like little whitish lumps of mucus, may be seen lying near the parents, and retain their cohesion for some time. The subsequent developmental stages, and especially the unequal segmentation of the ova, are processes which approximate very closely to the conditions which obtain among the marine mussels.

As the ova gradually develop the embryo first assumes a roundish oval shape, and then the shell-gland, an organ of extreme importance in the Pelecypoda, appears, and the embryo—or more correctly speaking the larva—shews as a broadly pear-shaped body, almost indistinguishable from the marine larvæ of *Modiolaria* or *Cardium*. This is the “Trochophore” stage, which in *Sphærium*, *Pisidium*, and Gastropods is passed through in a more or less modified form within the egg-membrane, but is preserved as a free-swimming or veliger stage in the case of *Dreissensia*. Until their discovery by Dr. Korschelt veliger larvæ were quite unknown in fresh water.

The development of the larva goes on until the shell-membrane has considerably increased in size, and presents the appearance of the bivalve mussel shell (fig. 1, s.). This condition continues for a long period, during which the characteristic velum, a fleshy organ fringed with cilia at its margin, appears. By means of the expanded velum, and ciliary movement, the larva can move very rapidly; and often when

Fig. 1.

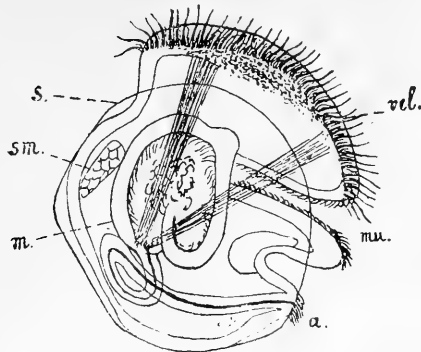


FIG. 1.—Young larva of *Dreissensia*, with bivalve shell (*s.*) and velum (*vel.*), seen from the side, *a*, anus; *m*, stomach; *mu*, mouth; *sm*, abductor muscle (from Korschelt, '92).

swimming at full speed may be seen to stop suddenly and impart a spinning motion to its velum. At the slightest disturbance the velum retracts; the valves of the shell, which are only slightly open, snap

Fig. 2.

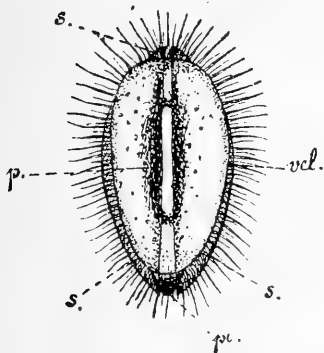


FIG. 2.—Larva of *Dreissensia*, looking down from above upon the velum, which is fully expanded; *p*, pigmentation of the velum (*vel.*); *pi*, pigment beneath the oral opening; *s*, shell, which is for the most part concealed by the velum.

Fig. 3.

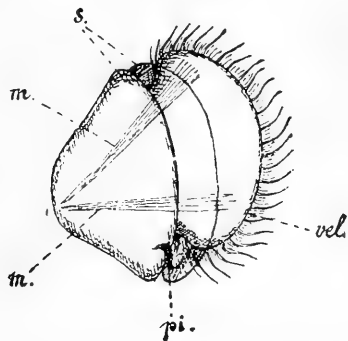


FIG. 3.—Older larva of *Dreissensia*, with velum greatly expanded, seen from the side; *m*, retractor muscles of the velum (*vel.*); *pi*, pigment; *s*, the two valves of the shell (from Korschelt, '92).

together and the larva sinks to the bottom until the danger is past. The larvæ swim in large numbers on the surface of the water, and I was able to capture many in the canal at Newsham, near Preston, by using a very fine net, on a perfectly calm and very hot June day. They are, however, so very small that it is easy to mistake them for rotifers—especially if the zone of cilia happens to be in active motion during examination.

Dr. Korschelt, in the course of his remarks, says:—"The chier

features in the larval organization are recognizable from fig. 1,—the bivalve shell (figs. 2—3, *s.*), the velum with its retractors, and a ciliation, also found in the larvæ of other mussels, in the neighbourhood of the anus. As in the *Trochophora*, the oral opening lies behind the powerful zone of cilia on the velum. In older larvæ there appears behind the mouth a peculiar pigmentation, which often has a bilobed appearance (figs. 2-4, *pi.*), which I was at first inclined to regard as the earliest indication of the byssus-gland; the position of the latter, however, would not well agree with this. A closer investigation of the subsequent stages will be necessary before we can decide whether a more important significance attaches to this formation."

Fig. 4.

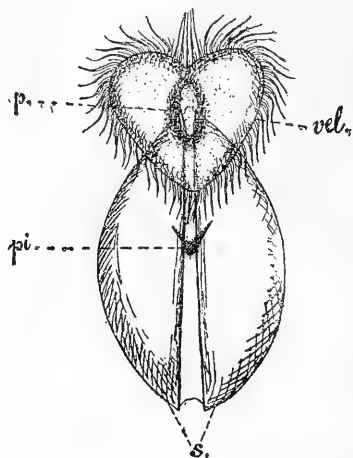


FIG. 4.—Older larva of *Dreissensia*, with expanded velum (*vel.*), which in the figure is viewed obliquely; *p.*, pigmentation of the velum; *pi.*, pigmentation in the vicinity of the mouth; *s.*, the valves of the shell (from Korschelt, '92).

The larvæ may be looked for at the end of June and early part of July. They swim about for eight days or so, feeding apparently upon minute floating algæ; during this pelagic existence the foot makes its appearance, and shortly after the larva sinks to the bottom for good. The velum then gradually disappears; the mantle and gills develop; the foot attains larger dimensions, and is capable of being protruded a long way from the shell, and the young mussel now progresses solely by the aid of this vermiform organ, which, when stretched out, goes through the movements of a feeler, and fixing itself by its extremity, contracts and so drags the body after it. The foot has now become an organ of locomotion in place of the lost velum, and by its aid the animal crawls actively about amongst the stones and mud, and over the waterweeds, and thus consequently passes through a second freely mobile stage.

Fig. 5.

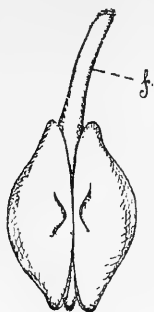


FIG. 5.—Dorsal view of young *Dreissensia* crawling, with foot (*f.*) much protruded (from Korschelt, '92).

By this time the little mussel is provided with an almost circular shell, which might be taken for a young *Sphærium*, and as it increases in size the growth of the foot is retarded, and gradually acquires the stumpy form possessed by the adult. The shell finally becomes fixed but still retains a certain amount of mobility, in that, under certain circumstances, *e.g.*, scarcity of water, it is able to detach itself from its base and move slowly to another spot, and during the winter it hibernates, casting off its byssus, and retiring under the mud in deep water.

There is not the slightest doubt that in the different phases of mobile power exhibited by *Dreissensia* during the early stages of its existence, we have the correct explanation of its astonishingly rapid dispersal. The ability of the larvæ to rove about, and the ease with which they can be carried to a long distance by currents, give them a great advantage over other freshwater bivalves.

In its more adult stages its tenacity of life, adaptability to circumstances, unusually rapid propagation, the power of attachment by a strong byssus to rafts of timber floating from place to place, or to bottoms of boats—thus enabling it to advance up streams—together with other facilities for dispersal quite independent of man's agency, have combined to make it one of the most successful molluscan colonists in the world. Altogether it is gratifying to think that Dr. Korschelt has, by his valuable discoveries, at last raised the veil of mystery which had previously hidden an unsuspected feature in the life-history of this shell, and helped materially to solve what was for long a profound puzzle to conchologists past and present.

The following is a list of all the local, and the principal general literature connected with the subject that has come under my notice:—

- '25 SOWERBY, J. DE C., [November 2, 1824, presentation of specimen of a freshwater shell, probably the *Mytilus polymorphus* Gmel, 3363]. *Trans. Linn. Soc.*, vol. 14, p. 585, 1825.

- '44 BROWN, CAPTAIN T., "Illustrations," ed., 2, 1844.
 '50 DYSON, DAVID, "Land and Freshwater Shells of the District around Manchester," 1850.
 '53 BYERLEY, ISAAC, "Fauna of Liverpool," *Proc. Liverpool Lit. and Phil. Soc.*, 1853-4, Appendix.
 '58 BELLARS, H. J., "Illustrated Catalogue of British Land and Freshwater Shells," 1858.
 '62 JEFFREYS, J. G., "British Conchology," vol. 1, 1862.
 '64 HARDY, JOHN, "British Terrestrial and Fluvial Mollusca, with the localities of the Manchester species," *Report Manchester Sci. Students' Assoc.*, 1864, Appendix.
 '65 MARTENS, E. VON, "Eine eingewanderte Muschel," *Zool. Garten*, Jahr. 6, 1865.
 '66 TATE, R., "Land and Freshwater Mollusca," 1866.
 '87 MELVILL, J. C., "Mollusca," *Brit. Assoc. Handbook, Manchester*, 1887.
 '87 REICHEL, L., "Ueber das Byssusorgan der Lamellibranchiaten," *Zool. Anz.*, vol. 10, p. 488, 1887.
 '91 HIGGINS, REV. H. H., Address to Liverpool Natural History Field Club, 1891.
 '92 KORSCHOLT, E., "On the development of *Dreissensia polymorpha*," *Ann. and Mag. Nat. Hist.*, (6), vol. 9, 1892.
 '93 KEW, H. WALLIS, "The Dispersal of Shells," *Internat. Sci. Series*, vol. 75, 1893.
 '95 COOKE, REV. A. H., "Molluscs," *Cambridge Nat. Hist.*, vol. 3, 1895.
 '96 OLDHAM, CHAS., "The Land and Freshwater Mollusca of Cheshire," *Naturalist*, April, 1896.

Notes on Isle of Man Mollusca.—During Easter of this year I spent a few days in the Isle of Man, but as the weather was very cold, and the time of year early, it was not much use looking for land shells in a systematic way. I nevertheless obtained the following, a record of which may be of interest:—

Douglas: *Limax maximus*, *L. arborum*, *Agriolimax agrestis*, *A. lævis*, *Milax sowerbyi*, *Vitrea cellaria*, *V. nitidula*, *Arion ater*, and var. *bicolor*, *A. intermedius*, *A. hortensis*, *A. fasciatus* var. *circumscriptus*, *Pyramidula rotundata*, *Helix aspersa*, *H. nemoralis*.

Peel: *Vitrea alliaria* var. *viridula*, *Helix nemoralis*, *Jamnia cylindracea*.

Groudle Glen: *Vitrea crystallina*, *Euconulus fulvus*, *Hygromia fusca*, *Cochlicopa lubrica*, *Clausilia bidentata*, *Carychium minimum*.

Ballaglas Glen: *Vitrea crystallina*, *Euconulus fulvus*, *Hygromia fusca*, *H. hispida*, *Helix nemoralis*, *H. hortensis*, *Cochlicopa lubrica*, *Acicula lineata*—this shell occurred alive on the Cambrian Schists underneath masses of *Marchantia polymorpha*, a plant which it appears specially to favour, and all found were the var. *alba*, a new record for the Island, and making a third station for the species.—B. R. LUCAS (*Read before the Society*, April 13, 1904).

Fish and Paludestrina jenkinsi.—With reference to Mr. Dean's note on "Fish and their relation to *P. jenkinsi*," (*Journal*, p. 15), I may say that where I have found the shell swarming there were no fish save a few sticklebacks and eels for it was in brackish water.—J. W. HORSLEY (*Read before the Society*, January 13, 1904).

PROCEEDINGS OF THE CONCHOLOGICAL SOCIETY OF GREAT BRITAIN & IRELAND

330th Meeting, April 13th, 1904.

Mr. Edward Collier (Vice-President) in the chair.

Donations to the Library announced and thanks voted:

“Bezeichnung der verschiedenen Richtung von Farbenbändern, Rippen und Furchen bei den Schalen von Mollusken,” “Einige Schnecken der Cocosinsel,” “Die geographische Verbreitung von *Pomatias septemspiralis*,” “Einige neue Arten von Meer-Conchylien aus den Sammlungen der deutschen Tiefsee-Expedition,” “Verbreitung der Meer-Conchylien an den Küsten von West- und Süd-Afrika,” “Land- und Süßwasser-Conchylien von Ost-Borneo,” “Conchylien von Urmia See,” by Dr. Ed. von Martens (*from the author*); and the usual periodicals received in exchange.

New Members Elected.

Professor Raffaello Bellini, R. Scuola Tecnica, Chivasso, Turin.

George Hubbard Clapp, 325, Water Street, Pittsburgh, Pa., U.S.A.

Arthur H. Gray, 509, Exchange Buildings, Boston, Mass., U.S.A.

Frederick B. Jennings, 152, Silver Street, Upper Edmonton, London, N.

Thomas Taylor, 4, London Road, Blackpool.

Candidates Proposed for Membership.

The Rev. Chas. Chichester, Shirwell Rectory, Barnstaple.

Frederic Henry Gravely, Dalton Hall, Victoria Park, Manchester.

Russell Currie Harrison, 7, Foulser Road, Upper Tooting, London, S.W.

Resignation.

The Rev. W. L. W. Eyre.

Papers Read.

“The British Species of *Vallonia*,” by B. B. Woodward.

“Notes on Isle of Man Mollusca,” by B. R. Lucas.

Exhibits.

By Mr. F. Taylor: *Helix pachygastra*, *H. badia*, *H. nigrescens*, *H. josephinae*, *Bulinulus exilis*, typical and varieties, and other shells from Dominica; also a fine series of living *Cæcilioides acicula* from Miller’s Dale, Derbyshire.

By Mr. W. Moss: A series of South African land shells, including some remarkable forms of *Ennea*, etc., which may prove new to science.

By Mr. B. R. Lucas: A series of the mollusca noted in his paper; also a small collection of land shells from Arles, France, including a series of *Rumina decollata*, of unusual form and colour, and in all stages of growth, taken out of a Roman sarcophagus.

By Mr. R. Standen: *Cyrena sumatrensis* from Borneo—one specimen cut open parallel to the umbones to shew interlocking of the peculiar “hinge-teeth” as seen from the interior when the valves are closed.

By Mr. C. H. Moore: A number of shells collected recently in Miller’s Dale, Derbyshire, including *Azeca tridens*, *Ena obscura*, *Cæcilioides acicula*, *Ancylus fluviatilis*, *Helix hortensis*, *H. arbustorum*, *H. concinna* and *Clausilia bidentata*.

By Mr. T. H. Platt: *Anodonta cygnea*, *Unio tumidus*, *U. pictorum*, *Sphærium rivicola*, *Vivipara vivipara*, and *Ancylus fluviatilis* from the Marple Canal—a portion of this canal having been run dry for repairs during Easter week an exceptional opportunity was afforded for the collection of an extremely fine series of shells.

A very fine selection of *Aporrhais* was shown—including the four recent species, *A. pes-pelecani*, *A. serresianus* and its var. *macandreae*, *A. senegalensis*, and *A.*

occidentalis; also a good selection of fossil forms from the Manchester Museum collection. The principal exhibitors were Dr. R. F. Scharff, Messrs. R. Standen, and J. W. Jackson, and the "Darbshire Collection," which contains a fine series of British and Mediterranean locality sets, was also shewn. Mr. Standen gave a sketch of the life-history, habitats, and general distribution of the recent species, so far as is known, and drew particular attention to the influence of locality upon the variation in form so strikingly shewn in the large series of *A. pes-pelecani* exhibited.

331st Meeting, May 11th, 1904.

Mr. Edward Collier (Vice-President) in the chair.

Donations to the Library announced and thanks voted:

The usual periodicals received in exchange.

New Members Elected.

The Rev. Chas. Chichester, Shirwell Rectory, Barnstaple.

Frederic Henry Gravely, Dalton Hall, Victoria Park, Manchester.

Russell Currie Harrison, 7, Foulser Road, Upper Tooting, London, S.W.

Names Struck Off the List.

The following names have been struck off the List in terms of Rule 4:

H. K. Jordan, G. E. Mason, R. D. Sykes.

Papers Read.

"The Cypræidæ of the Persian Gulf, Gulf of Oman, and North Arabian Sea, as exhibited in F. W. Townsend's Collections, 1893-1904," by J. Cosmo Melvill and R. Standen.

"*Rostellaria delicatula*: Notes on its Distribution and Limits of Variation," by J. Cosmo Melvill and R. Standen.

"*Helix pomatia* m. *sinistrorsum* in Surrey," by F. B. Jennings.

Exhibits.

By Mr. J. M. Williams: A number of rare and choice varieties of *Cypræa*, including *C. picta* with blue base; *C. erosa* with dorsal surface ashy blue and base white; *C. tabescens* var. *pellucida*; *C. caurica* var. *obscura*; and a dark variety of *C. errones* from New Caledonia; *C. brevidentata*; very fine typical *C. pulchella*; and a small pale variety of *C. caput-serpentis*.

By Mr. R. Cairns: Many fine specimens of *Cypræa*, including the new variety of *C. caurica* described in Messrs. Melvill and Standen's paper; *C. erosa* var. *nebrites*; and varietal forms of *C. ziczac*.

By Mr. R. Standen: A remarkable form of *Cypræa talpa* in which the rich black basal coating of enamel spreads half way up the side of the shell, and terminates in rows of spots and fleckings of rich brown.

By the Rev. L. J. Shackleford: *Cypræa lurida* from St. Helena; *Helix aspersa* picked up on the beach at St. Vincent, Cape Verde Islands, and tenanted by hermit crabs.

By Mr. A. J. Jukes-Brown and the Rev. L. J. Shackleford: *Unio nyassaensis* and varieties, *Spatha alata* Lea, *Paludina robertsoni* Frfld., *Physa nyassana*, *Melania tuberculata*, *Mel. admirabilis*, *Lanistes nyassana* Dhrn., *L. solidus* Smith, and *L. affinis* Smith—all from Lake Nyassa, Central Africa, and collected last year by Mr. Philip Young.

By Mr. J. D. Dean: *Limnæa auricularia*, *Neritina fluviatilis*—a large number, all taken from one stone, to illustrate the abundance of this species in this particular locality; *Ena obscura*, and *Hygromia rufescens*, from localities near Lancaster; also sub-fossil *Succinea* from a deposit at Hale Moss.

By Mr. R. Welch: *Vitrea lucida* Drap., from Tenby, and Bushy Park, Dublin—a new Irish locality; *Planorbis carinatus*, *P. vortex*, *Limnæa palustris*, *Physa fontinalis*, and *Valvata piscinalis* from River Erne, Co. Cavan, Ireland.

By Mr. J. W. Jackson: Living sinistral *Helix pomatia* collected at Box Hill, Surrey, by Mr. F. B. Jennings.

By Mr. Cosmo Melvill: A fine example of *Voluta bednalli* Brazier, being the specimen till lately in the collection of Dr. J. C. Cox, of Sydney. It is smaller than the one figured by Mr. G. B. Sowerby in *Proc. Mal. Soc.*, vol. 1, pl. 5, but as finely marked. Mr. Sowerby has kindly supplied information about this species. The type is still in the hands of Mr. Bednall, of Adelaide. The large and fine example figured as above is in the collection of Mr. J. J. Macandrew, of Ivy Bridge, Devon, and another somewhat juvenile specimen exists, but its location is unknown. These four constitute all that is at present known about this, one of the most beautiful, isolated, and bizarre of the genus. The locality is Port Darwin, N. E. Australia. The original types of *Cypræa lentiginosa* Gray, formerly in the Gaskoin collection, and of *C. pyriformis* Gray, were also shewn.

The very fine series of *Cypræa*, and *Rostellaria delicatula* Nevill, from the Townsend collection was shown to illustrate Messrs. Melvill and Standen's papers.

A large number of locality series of *Planorbis carinatus* and *P. umbilicatus* were shewn from widely diverse stations in Great Britain and Ireland by Messrs. E. Collier, J. W. Jackson, B. R. Lucas, R. Welch, A. Stelfox, R. Standen, and from the collections of the Society, and Manchester Museum. A long discussion followed in which it appeared that whilst most members had little difficulty in picking out from a large series typical examples of either species, there are large numbers of what seem intermediate forms which are very puzzling even to an experienced collector. The question was raised of hybridity between the two, a point certainly worth investigating, and which, if proved, may account for the number of forms showing partial affinities with either species.

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***Succinea oblonga* Drap., var. *alba*.**—Amongst a number of *Succinea oblonga* which I collected near Ilfracombe on Aug. 6th, 1903, were a few examples of a pure white form, which does not appear to have been hitherto noted and I propose to call var. *alba*. The rest of the specimens were very much darker in colour than any I have seen from other localities, but unfortunately the greater part were dead. The habitat is on some low lying land amongst sand dunes, and although the dry appearance of the ground shewed that it had not been covered by water for some time previously, the presence of a few *Linnea truncatula* indicated that such was not always the case.—C. E. WRIGHT (*Read before the Society*, December 9, 1903).

***Helix pomatia* m. *sinistrorsum* in Surrey.**—While out with an entomological friend at Box Hill, Surrey, on May 1st, he picked up and brought me a few specimens of *Helix pomatia*, amongst which I at once noticed a sinistral specimen. Although it is immature, and not in particularly good condition, I have thought this specimen worth exhibiting and recording, since Mr. Lionel E. Adams in his "Manual" (ed. 2, 1896, p. 60), states that the sinistral form has not been recorded from this country.—F. B. JENNINGS (*Read before the Society*, May 11th, 1904).

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ON SOME QUESTIONS OF NOMENCLATURE.

By A. J. JUKES-BROWNE, B.A., F.G.S.

(Read before the Society, September 14, 1904).

THERE is a rapidly increasing sense of dissatisfaction among zoologists and palæontologists with regard to the existing state of things in the matter of nomenclature. The enforcement of the rule of priority has led to the digging up of so many ancient authorities and to the alteration of so many names, that one feels there are few of our old-established generic names which may not be dethroned and supplanted and one wonders which will be the next to go.

Now, if these changes of name were based on universally acknowledged principles, so that once altered there could be no doubt of the new name being accepted and adopted by all zoologists in every country, the inconvenience of the change could be endured, and zoological nomenclature would gradually become fixed and definite. But this is far from being the case. There are several points of prime importance which have never yet been decided by any authoritative body or congress; moreover, changes are constantly being proposed by individuals without the sanction of any national committee or council. The consequence is that there is often a conflict of individual opinion, and in the absence of any tribunal to which appeal can be made, the ordinary naturalist is uncertain which name ought properly to be used.

As regards our own province of Mollusca, it is notorious that different countries are guided by different rules and customs in this matter, and even in our own country different authors and publishing institutions use different names for the same shell. I propose to call attention to some of these cases in the hope that a discussion may lead to some more combined action being taken in the matter.

I pass over the question of pre-Linnéan nomenclature, and assume that all zoologists will eventually agree to take 1758, the date of the tenth edition of the "*Systema Naturæ*," as the starting-point for binomial nomenclature. After fixing this date, the most important question that arises is whether generic and sub-generic names published without descriptions or figures in catalogues of old collections of shells should be admitted and adopted. It has generally been answered in the negative, and we find Dr. P. Fischer, on p. 319 of of his "*Manuel de Conchyliologie*," formulating a rule to "reject every specific or generic name which is not based on a sufficiently clear description or on a reference to accessible illustrations ('iconographie convenable'); as a consequence to beware of accepting the names printed in sale catalogues (Humphrey, Bolten, etc.), which are without value and without any definition, and only tend to foster the hydra of synonymy."

Fischer himself, however, was not consistent, for he has accepted some of Bolten's names, and also the names proposed by Mörch in in his catalogue of Count Yoldi's collection, issued in 1853. Mörch's names are indeed generally accepted, but they were not accompanied by descriptions or definitions of any kind; certain species are assigned to each and sometimes figures are referred to, but this has not prevented subsequent writers from giving different interpretations to his names, for it is not possible in every case to be sure what special characters Mörch had in his mind when grouping certain species under a new name.

Quite recently, and in a communication to this Society,¹ Dr. Dall has discussed the claims of the two publications which were specially mentioned and condemned by P. Fischer. He agrees with Fischer that Humphrey's catalogue is not entitled to be cited, because it was issued without the name of either author or publisher, and because it gives no diagnoses and cites no figures. He maintains, however, that the case is otherwise with Bolten, in whose "*Museum Boltenianum*" (1798) "though no diagnoses were given, full citations of name, volume, page, and figure of previous authors were provided, and there seems to be no way in which we can consistently refuse to adopt the Boltenian name, if we accept any names given without a diagnosis, as has now become a common practice."

¹ *J. of Conch.*, vol. II, p. 50.

Dr. Dall's proviso just indicates the point that requires to be settled ; it may have become the common practice, and it may be a reasonable practice, but the principle involved has not been definitely accepted by any general committee or congress of delegates from the principal societies either in America or this country. Until it has been discussed and settled by such a congress in one or both countries, it is open to any individual or society to dispute Dr. Dall's opinion and to refuse acceptance of Bolten's genera. Indeed, it is only of recent years that Dr. Dall has been of this opinion, for up till 1898 he refused to use Bolten's names, though F. B. Meek had adopted them in 1876.

I am informed by Dr. von Maehrenthal that he would consider the catalogues of Bolten and Mörch as "publications" according to the rules of the German Zoological Society, and would regard the names proposed by them as properly introduced into the Linnean nomenclature, if they are accompanied by sufficient definitions or "indications." He adds that as some of the Bolten names are accepted by German conchologists it would be illogical to make any exceptions in favour of other better-known names. He admits, however, that the International Zoological Congress has not yet adopted any definition of what constitutes "publication." Further, some names may have a sufficient indication and some may not, so that each case must be decided on its own merits.

The admission of Bolten's names would lead to the displacement of many now in use, and it is consequently very desirable that this question should be authoritatively settled as soon as possible. The following are some well-known names which will have to give place to Bolten's, if his authority and priority are admitted, and if the figures to which he refers are clearly recognisable :—

<i>Pleurotoma</i>	will become	<i>Turris</i> .
<i>Fasciolaria</i>	„ „	<i>Colus</i> .
<i>Melongena</i>	„ „	<i>Galeodes</i> .
<i>Fulgur</i>	„ „	<i>Busycon</i> .
<i>Turbinella</i>	„ „	<i>Xencus</i> .
<i>Cynodonta</i>	„ „	<i>Vasum</i> .
<i>Oniscia</i>	„ „	<i>Morum</i> .
<i>Ranella</i>	„ „	<i>Bursa</i> .
<i>Solarium</i>	„ „	<i>Architectonica</i> .
<i>Scalaria</i>	„ „	<i>Epitonium</i> .
<i>Corbis</i>	„ „	<i>Gafrarium</i> .
<i>Lithophaga</i>	„ „	<i>Lithodomus</i> .

The next point to which attention may be called is the care with which any of the older writers should be studied before any of their

names are pressed upon the acceptance of modern zoologists. It is not sufficient to refer to one of these old authors for the purpose of seeing what names he used and what species are specified; his treatise must be studied as a whole, and his method of arrangement and nomenclature must be thoroughly understood before any of his names can be allowed to displace others.

To illustrate this point and to demonstrate how careful the enquiry into the validity of any name should be, I propose to discuss the special difficulties which occur in the cases of three well known genera.

1. **Nuculana v. Leda.**—The name *Nuculana*, used by Link, in 1807, has been widely adopted as having priority over the *Leda* of Schumacher (1817), but Dr. Dall considers that there is really no reason to suppose that Link intended to separate the elongate species from the Lamarckian genus *Nucula* under a new name of *Nuculana*.¹

The facts seem to be that in 1807 Link published a catalogue of the Rostock Collection, in which he broke up several of the older genera, and proposed many new names; most of these are properly diagnosed and are available for use wherever they have priority, but he also seems to have altered some previously existing names simply for the sake of improving (in his opinion) the form or spelling of the name. Thus without giving any reason he writes *Limaria* for *Lima*, *Harpalis* for *Harpa*, *Nassaria* for *Nassa*, *Pectinium* for *Pecten*, and *Anatium* for *Anatifera*. It is hardly necessary to point out that these are needless and inadmissible alterations.

The name *Nucula* does not occur in Link, and it would seem that, as in the cases above cited, he meant to adopt Lamarck's genus, but to alter the form of the name from *Nucula* to *Nuculana*. As Dr. Dall remarks:—"Link was enumerating the Rostock Collection, and since it happened that they had only one species, *N. rostrata*, to represent the genus, it follows the modified name, but there is nothing in this fact nor in the diagnosis of Link to intimate that he intended to sub-divide the original *Nucula*" (*op. cit.*, p. 572).

A mistake of this kind is a serious matter, for in the case of this genus, after being known as *Leda* for the greater part of last century, the leading conchologists and palæontologists were finally led to believe that *Nuculana* was a genuine new name when proposed, and as in that case it clearly had priority of *Leda*, it has been adopted in various private and official publications; whereas, if Dr. Dall be right in his contention, the displacement of the name *Leda* was an absolutely needless interference with established nomenclature.

It is, of course, quite possible that some conchologists will dispute Dr. Dall's reading of Link, and no doubt it is a debateable question,

¹ *Trans. Wagner Free Inst. Sci. Philadelphia*, vol. 3, pt. 4, p. 572, 1898.

but this only makes it the more necessary that it should come before properly qualified committees for settlement.

2. **Glycymeris v. Pectunculus.**—The next instance of a name that seems to call for international settlement is that of *Pectunculus*, which is intimately associated with those of *Nucula* and *Glycymeris*. Both the names *Pectunculus* and *Glycymeris* had been variously used by different writers before 1758, but the first binomial author who used the names seems to have been Da Costa, in his "British Conchology" (1778). This fact was pointed out by Dr. Dall in 1898 (*op. cit.*, p. 571).

Da Costa used the name *Pectunculus* for the group of shells already called *Venus* by Linnæus, and he applied the name *Glycymeris* to those members of the Arcidæ which have a curved or bent hinge-line, as typified by the *Arca glycymeris* and the *A. nucleus* of Linnæus. In 1799 Lamarck, apparently being ignorant of Da Costa's use of the two names, gave the name *Pectunculus* to *Arca glycymeris*, and that of *Glycymeris* to the shell now generally known as *Panopæa*, at the same time separating the *Arca nucleus* as the type of a new genus *Nucula*. It seems clear, therefore, that Lamarck had no right to use the names *Pectunculus* and *Glycymeris* in the way he did, because they were pre-occupied by Da Costa; and, further, that the name *Pectunculus*, if available at all, can only be used for some sub-division of *Venus*.

Lamarck, however, had a perfect right to separate the two Linnæan *Arce*, and to make them types of the two new genera, but if we accept the *Nucula* of Lamarck, the *Glycymeris* of Da Costa must remain for the *Arca glycymeris* type. Thus, by a slightly different or more expanded line of argument, I come to the same conclusion as Dr. Dall, and need only add that Poli's name *Axinæa* (1795) is long antedated by Da Costa's, even if Poli's generic names could be accepted.

3. **Modiola v. Volsella.**—The next and last case that I wish to discuss is one on which opposite opinions have quite recently been expressed, and for which the decision of an international tribunal, or at any rate of an Anglo-American committee, is urgently needed.

The question is whether the *Modiolus* or *Modiola* of Lamarck (1799) ought to give way to the *Volsella* of Scopoli (1777). The Committee of this Society, which is responsible for the revised list of British Marine Mollusca, retained the name *Modiolus* in the first issue of the list (1901), but in their supplementary report of 1902 they recommended that the name *Volsella* should be substituted, having evidently been converted to this opinion in the interval. The point on which this question depends is a curious one, and can only be decided after a fair consideration of the circumstances of the case.

As Scopoli's "Introduction to Natural History" is a rare book, and as I have only been able to consult it through the kindness of friends who have sent me copies of the portions relating to this matter, it will be convenient if I explain his method of arrangement, for this is an essential part of the question. Scopoli divides the bivalves into two orders, under the headings "Distributio I., cardine edentato," and "Distributio II., cardine dentato." Under the first head he placed the genera *Anomia*, *Ostrea*, *Mytilus*, and others; under the second head he placed the genera *Volsella*, *Pteria*, *Solen*, and others. It is clear, therefore, that by his own method of arrangement *Volsella* must be a group of shells which possess a toothed hinge, which *Modiola* does not. In other words, "cardine dentato" must be read into the definition of every genus included under his Distributio II.

The first of these genera is *Volsella*, which is thus defined:—

"Testa bivalvis, cardo sulcus longitudinalis, obsoletus, quem terminant denticuli exigui, vix manifesti.

Mytilus modiolus Linn., dente unico.

Gula soricis Lister, dentibus 1-2.

Mytilus, *L'aber* Adanson, dentibus pluribus."

Now, those who wish to substitute the name *Volsella* for *Modiola* rely on the rule of taking the first species mentioned by the author of a genus as the type of the genus, whether he meant it so or not; in this case it is *Mytilus modiolus*, which is the very species afterwards taken by Lamarck as the type of his genus *Modiolus* (so spelt in 1799). If Scopoli had made no mistake there would be no more to be said, for the priority is unquestionable, but he described *M. modiolus* as having a single tooth (dente unico), and he expressly states that both his other examples have teeth, while in his definition of the genus he says it has small teeth at the end of the hinge. It is, therefore, abundantly clear that he would not have put any shell into this genus if he had not believed that it possessed hinge-teeth. It is obvious that he intended to leave those species of the Linnæan genus *Mytilus* which had no teeth under that name, and to create a new genus for those which had teeth (one or more).

How Scopoli came to imagine that *M. modiolus* had a tooth at either end of the hinge, it is impossible to understand, and probably we shall never know, but as this species does not occur in the Mediterranean, he may only have known it from figures. Anyway, he did make an extraordinary mistake concerning it, and in consequence of this mistake it seems to me unreasonable and impossible to follow the usual rule of taking the first species as a type. It is in this case disqualified by the fact that its characters are not those of the genus *Volsella*, as defined by Scopoli himself. To make it the type of a genus with a toothless shell under the name of *Volsella*

would be to stultify Scopoli's own work, when we desire to honour him by adopting his name in recognition of the fact that he was the first to separate certain shells from the Linnæan assemblage of *Mytilus*. Common sense will surely tell us that we have no right to use any name in a manner which would reverse the obvious intention of the author in establishing the group it represents.

There is another consideration which leads to the same conclusion. Scopoli's genus *Volsella* is clearly a composite one, for it includes shells with three different types of hinge, so different that at the present day they would probably be regarded as belonging to different genera. One of these shells was afterwards taken by Lamarck as the type of his new genus *Modiolus*, and no rule is broken by the acceptance of Lamarck's name for this genus, because other species are left to represent Scopoli's genus. It is, therefore, the *Gula soricis* of Lister or the *Mytilus paber* of Adanson, which should be taken as the type of the genus *Volsella*. I have examined the second edition of Lister's "Historiæ Conchyliorum," but am unable to find any shell bearing the extraordinary name of "*Gula soricis*," nor anything that Scopoli could have taken for that name. As regards the *Mytilus paber* of Adanson, his figure is so bad that it may be called unrecognisable. Consequently, it seems to me that Scopoli's genus *Volsella* does not include anything that can be taken as a type and that the name should be dropped altogether. On this question I am pleased to find myself once again in accord with Dr. Dall (see *op. cit.*, p. 786), but I know that certain authorities in this country persist in taking the opposite view. There is, therefore, need for an authoritative settlement of the matter.

From the instances above given I think I have shown how pressing is the need for the discussion of these questions of nomenclature by some duly qualified body. I see no reason why conchologists should wait till other zoologists begin to move. The Conchological and Malacological Societies could appoint a British Committee, and the very formation of such a committee would probably lead to the appointment of others in America, France, and Germany. Each might draw up a report of its own conclusions, and then arrange for a conference to discuss the points on which they differ.

Testacella scutulum in Worcestershire.—On the morning of the 28th of March, whilst walking along Middleton Hall Road, King's Norton, Worcestershire, I was delighted to find a fine specimen of *Testacella scutulum* crawling along the gravelled footpath. The body is of a yellowish buff colour. Also on the 30th I found a much smaller specimen of the var. *albina*, and on April 16th I found three more specimens like the first one.—J. MADISON (*Read before the Society*, June 8th, 1904).

OBITUARY NOTICE OF PHILIP BROOKES MASON.

BY THE REV. CHAS. F. THORNEWILL.

(Read before the Society, September 14, 1904).

PHILIP BROOKES MASON was born at Burton-on-Trent, on Jan. 2nd, 1842, and derived his second name from his mother, who survived him by a few months. He was educated at Burton Grammar School, and afterwards at Epsom College, and after a distinguished career at University College, London, returned to Burton to take up his father's practice as a surgeon, which he gradually extended and developed, until he became one of the most popular doctors in the midland counties. But he was even better known as a naturalist of no mean order—shells, birds, insects of all descriptions—nothing came amiss to him, and his collections increased year by year, until at length it became necessary to adapt some buildings in the rear of his house, in order to provide a museum for their accommodation. His acquaintance with almost every branch of natural history was remarkable, and his collections were always readily thrown open for the inspection of naturalists, many of whom owe much to his kindness and hospitality.

He was President of the Conchological Society in 1893, was elected a Fellow of the Linnean Society in 1872, and of the Entomological Society in 1874; in 1884 he became a Member of the Société Entomologique de France, and for the last ten years of his life he was a member of the Entomological Club.

Mr. Mason's numerous professional engagements of course hindered him from doing much in the way of field work; but he took a keen interest in all that was going on in the natural history world, and when the opportunity was given him he displayed all the ardour and faculty of observation which distinguish the born naturalist. The present writer well remembers a delightful excursion which he took, in company with Mr. Mason and his friend, Dr. Garneys of Repton, to the west coast of Scotland and Skye during the summer of 1873. Each member of the party collected something, Mr. Mason's share being the plants, in which some noteworthy 'finds' were made; and at the conclusion of the trip, which lasted for three weeks, the three collectors met in succession at each other's houses to divide the spoils and 'fight their battles o'er again,' amid the fumes of much tobacco. It was a memorable trip, and many a laugh have the three participants enjoyed over it before two passed over to 'the majority.' Mr. Mason took a prominent part in the foundation of the Burton-on-

Trent Natural History and Archæological Society, of which he was several times President, and to whose proceedings he made some valuable contributions; and this Society is still in a flourishing condition.

It is not generally known that Mr. Mason became the eventual possessor of the notorious 'Shapira' manuscript, which for a time deceived some of the most experienced authorities on such matters, but was at length discovered to be a remarkably clever forgery. He acquired several of the most notable entomological collections in existence, including the Lepidoptera of Mr. Edwin Brown, Mr. Douglas, and Mr. Wilkinson; the Coleoptera of Mr. Rye and the Rev. A. Matthews; the Aculeate Hymenoptera of Mr. F. Smith; and the Hemiptera of Mr. Douglas and Mr. Scott.

His natural history library, which has just been dispersed at Stevens', was a very complete and valuable one. For several years past his health had been manifestly failing, and in spite of the unremitting attention of his devoted wife, he passed away on Nov. 5th of last year, beloved and lamented by a large circle of friends, both private and scientific. Mr. Mason left no family, and his various collections have passed into the keeping of his widow.



Report on the Miller's Dale Ramble.—Owing to the number of species to be found in this dale and its close proximity to Manchester, it was again decided to have a ramble to this district, July 16th, therefore, again found us here. The day was favourable, and we were looking forward to a good bag. On arriving at Miller's Dale station we were met by Mr. T. Hey, of Derby, who had brought up his party representing the Midland Railway Natural History Society, Derby. A move was then made towards the habitat of *Cæcilioides acicula*, for which the dale is noted, and a number of dead and living examples were soon collected. The other shells common in the dale were *Helix hortensis*, vars. *lutea*, *coalita*, etc. (still confined to the clump of nettles near the railway arches); *H. arbustorum*, the greater number of which were var. *flavescens*; *H. nemoralis* (not common living, but quantities of broken shells were noticed strewn about). Two specimens of *Helicigona lapicida* were found, and numerous examples of the following were taken: *Pyramidula rupestris*, *P. rotundata*; *Hygromia hispida*; *Vitrea nitidula*, *V. alliaria*, *V. crystallina*; *Euconulus fulvus*; *Jaminia muscorum*, *J. cylindracea*; *Clausilia bidentata*; *Ena obscura*; and *Carychium minimum*. In the river we found numbers of *Limnea pereger* and *Ancylus fluviatilis*. *Arion ater* was the only slug noticed, this being very abundant, but no varieties were found.—J. WILFRID JACKSON (*Read before the Society, September 14, 1904*).

RE-ESTABLISHMENT OF LIMAX TENELLUS AS A BRITISH SPECIES.

BY W. DENISON ROEBUCK, F.L.S.

(Read before the September Meeting of the Leeds Branch, and before the
Society, September 14th, 1904).

IT is a great satisfaction to be able to re-establish a species which has hitherto occupied but a precarious and doubtful place in the list of British mollusca, and I am now in a position to do this in the case of *Limax tenellus*, of which a number of living specimens have recently been sent to me for identification by the discoverer, the Rev. Robert Godfrey, of Edinburgh, who finds it is the common slug of the pine-woods of the Forest of Rothiemurchus, in the Vice-county of Easternness.

Mr. Godfrey had, at my request, been collecting living slugs during the past month or two in various localities in the highlands of Scotland, with good success, the occasion of his activity in this direction being that we are endeavouring to obtain the various species of *Arion* from all the counties and vice-counties of the British Islands from which we have not yet seen them, in order that the maps given in the forthcoming part of Mr. J. W. Taylor's Monograph may be the more complete.

Mr. Godfrey sent me the first two examples on the 27th of August, when I at once saw that he was right in suspecting them to be this species, though the slime was not quite so yellow as he has observed it in Switzerland. These two were immature, the smaller, which was very lively and active, being only about ten mm. long, and the other one, which was referable to the var. *fulva*, twenty-five mm. in length when crawling, and darkish in colour, the yellow slime not being very evident. I at once congratulated Mr. Godfrey on his success, and asked for more specimens, in order that Mr. Taylor and I might study them in bulk. He sent me about a couple of dozen on the 29th and 30th of August, which were all much lighter in colour than the first two, very yellow, and referable to var. *cerea*, their waxy-like appearance making the varietal name very appropriate and significant. The largest specimen measured thirty mm. in length when crawling, twenty mm. when at rest.

It was satisfactory to learn that the species is the common slug in the pine-forest of Rothiemurchus, although it is somewhat surprising that a species occurring so commonly should have escaped detection by conchologists all these years. Mr. Godfrey describes its chief haunts as being on old pine-branches lying half smothered in the masses of blaeberreries, whortleberries, and heather. These branches

are covered with decayed pine-needles and other rotten vegetation, amongst which the slugs are concealed. Several examples were found under stones. Its ordinary companions are *Limax arborum* (specimens of which sent to me were of the montane form, sub-var. *alpestris*, and also of the type-form, somewhat dark) and also *Limax cinereo-niger* in its varieties *maura* and *luctuosa*, as well as *Arion subfuscus* and *A. minimus*, but *L. tenellus* outnumbers them all.

In general appearance the bulk of the specimens, those referable to var. *cerea*, have a decided waxy-yellow appearance in general, caused by the colour of the body-slime. The pedal or locomotory-slime is clear. In some cases, perhaps in most, the specimens are more or less faintly banded.

On the 3rd of September I sent an example to Mr. William Evans, F.R.S.E., of Edinburgh, which reached him just as he was setting off for the Forest, in Clackmannanshire. He made search there, and at once found several specimens, three of which I have seen and are referable to var. *cerea*. They were found under rotten branches and chips of wood and pieces of bark lying on the ground in the fir woods, and one on a fungus—a species of *Russula*. Its companions in this case were about a similar number of *Arion subfuscus* and one *A. minimus*.

On the 8th of September I received a collection of various slugs from Mr. Charles McIntosh, who had collected them on the 6th, about Inver, near Dunkeld, which is in the vice-county of Mid-Perth, which included various species of *Arion* and *Limax*, and—to my great gratification—a characteristic and unmistakable example of *L. tenellus* var. *cerea*.

On the 24th of September I received a similar mixed collection of slugs from Mr. George Sim, A.L.S., of Aberdeen, who had collected them the previous day at Invercannie, near Banchory, Kincardineshire, in which I was pleased to find a fine example of the var. *cerea*.

It is particularly satisfactory that the first record should be so promptly confirmed by similar ones from three quite different localities and counties, and we may now look confidently forward to hearing of others, in England as well as Scotland.

The species is an unmistakable one when carefully examined, owing to its yellow body-slime, its black tentacles, and the very black and broad parallel retractor-muscles seen on the neck. It cannot be confounded with any other *Limax*; the only slug it can be really mistaken for in the field is *Arion subfuscus*, which it resembles somewhat in outward aspect, in the same manner as *Limax cinereo-niger* in its completely black form, var. *maura*, is passed by as *Arion ater* by field observers who do not look sufficiently closely for the generic distinction.

In Great Britain *Limax tenellus* has been reported as found in five different counties.

The first record was of a single example of what was evidently the var. *cerea*, which was found by Mr. Blacklock, in County Durham, in a wood at Allansford near Shotley Bridge, and sent to Mr. Joshua Alder, who made a coloured drawing of it, which is now in the possession of the Rev. Canon A. Merle Norman, and was reproduced on one of the plates of Forbes & Hanley's "British Mollusca," in 1853. This drawing, which I have seen more than once, is a characteristic portrayal of the species, and we can have little doubt as to its having actually occurred in Durham County. But it is remarkable that it has never been seen there since, and it would be of interest to re-examine the locality, especially if the woods have remained in the same state as when it occurred.

The second record was for North Mavine, in the Shetland Islands, on stones in the watercourse of a mountain mill, and appeared in Jeffreys' "British Conchology," 1862, p. 156. The locality seems likely enough, but the habitat given is suggestive more of *Agriolimax lævis*, and there is no evidence as to whether the slug was correctly identified nor as to who determined it, and therefore doubt as to specific identification is permissible. As an authority Jeffreys himself is out of the question, for by his own statement he never professed to know the slugs critically,

The third and fourth records were made by Mr. J. Conacher, jun., in *The Naturalist*, for July, 1878, p. 177, where he recorded it as found in great numbers in hedge-bottoms, near Irvine, in Ayrshire, in June, 1878, and also on the Island of Bute, near Rothesay. Mr. Conacher particularly noted that the yellow colour was entirely due to slime, and that he also carefully examined the shield with a microscope, showing that he presumably did not mistake *Arion subfuscus* for it. In this case also it would be well to re-investigate the "hedge-bottoms" and ascertain what species occur there. It is on the face of it an unlikely habitat, unless there is primitive pine-forest close by, and the date (June) is unlikely for an autumnal species like *L. tenellus*. Neither Mr. Conacher nor Mr. Whitwham, who also saw the slugs, both of whom were personal friends of my own for several years, were limacologists, and the modern study of limacology itself had not commenced in Britain at that date, so that it is quite possible they might have mistaken, say, *L. flavus* for it.

The fifth and last record, for Yorkshire S.W., for Hemsworth and Sharlston, not common, given by Mr. Joseph Wilcock, in the Wakefield Naturalists' Society's Report for 1888, p. 28, may safely be disregarded, for Mr. Wilcock was not a slug-student in special,

although a good conchologist, and the localities given are not likely ones, besides which the report includes various other improbable things, so that this record of *L. tenellus* may be either a mis-print or an error of determination. At all events it is not proven.

This species is omitted altogether from the current edition of the Conchological Society's List, though it appeared in the former editions of 1883 and 1892, in the latter case with mark of doubt, so that the present record is equivalent to the addition of a new mollusc to the British fauna.

The addition to the catalogue of British mollusca will now stand as follows :—

***Limax tenellus* Müller (em. Nilsson).**

v. cerea Held.

v. fulva Normand.

The general distribution of *L. tenellus* is interesting, and fully bears out the soundness of the views so ably set forth by Mr. Taylor in his Monograph as to the origin and dispersal of molluscan life. It is one of the weaker forms of life which have been driven into the remoter and more uncongenial regions by the more dominant forms which are of higher and later development, and its range shows that Central Europe is most probably the centre of origin of our molluscan forms of life, and it is well known that the species which now inhabit that region include the strongest and most highly developed of all known to exist, surrounded on all sides by the weaker and more primitively organized forms.

Limax tenellus in Britain is in like manner driven to inhabit the remote fastnesses of pine forests and perhaps heathy tracts, where the higher forms which have ousted it from the best districts do not seem to occur, and where it is accompanied by similarly less highly developed species.

Now that *L. tenellus* is ascertained to be truly a member of the British fauna, it would be well to have it carefully searched for, more especially in the autumn, which is its main time of occurrence, and on fungi, etc., in the deeper recesses of ancient pine forests throughout the kingdom.



THE CONCHOLOGICAL DIFFERENCES BETWEEN THE GENERA AND SECTIONS OF THE PUPININÆ.

By EDWARD COLLIER.

(Read before the Society, June 8th, 1904).

My principal purpose to-night is to bring before you the shells of the sub-family Pupininæ, and more particularly the differences between the various sections of the genus Pupina. I have up to recently arranged my shells after Paetel, who places the Pupininæ in the family Cyclostomacea, but according to Fischer they belong to the family Cyclophoridae, which view I believe to be correct.

Paetel in his catalogue divides his sub-family Pupina into the following ten genera, viz.:—*Megalomastoma*, *Tomocyclus*, *Cataulus*, *Rhaphaulus*, *Streptaulus*, *Pupinella*, *Mesostoma*, *Pupina*, *Pseudopomatias* and *Bellardiella*, but Fischer in his sub-family Pupininæ has only five genera, viz.:—*Pupina* (in which he includes as sub-genera *Streptaulus*, *Pupinella* and *Anaulus* or *Rhaphaulus* and places *Bellardiella* as only a section of *Pupina*), *Hybocystis*, *Cataulus*, *Coptocheilus* and *Megalomastoma* in which he includes *Tomocyclus* as a sub-genus.

The Pupininæ, with the exception of *Megalomastoma* and *Tomocyclus*, are all found in the region bounded by India, Burmah, through the lower part of China to Japan, down through the Philippine Islands and New Guinea, including the Solomon Islands, New Hebrides and New Caledonia to the northern part of Australia and the islands between there and Ceylon. In the Cambridge "Natural History, Section Mollusca," by the Rev. A. H. Cooke, this region coincides with what he calls the Oriental Region, with the addition of New Guinea and the neighbouring islands to the east, from his Australian Region.

Megalomastoma and *Tomocyclus* according to Fischer are all found in the West Indies and Guatemala, a very different locality from the Pupininæ, but he only includes the true *Megalomastoma*, with its section *Farcimen* and its sub-genus *Tomocyclus*. Paetel, however, includes in *Megalomastoma* section *Hainesia*, which Fischer puts in the Cyclostomatidae, because of the form of its horny operculum. Paetel also includes section *Coptocheilus*, which Fischer separates from *Megalomastoma* and makes into a separate genus, and as all the *Coptocheilus* come from the Oriental Region I have no doubt this will be correct. Paetel, however, gives two species of *Coptocheilus*, one from Guatemala and the other from Hayti, but on comparison these are not referable to *Coptocheilus* as there seem to be no generic differences between his *Coptocheilus guildingianum* Pfr. and his *Megalomastoma antillarum* Sow.

The following is the arrangement of Fischer as to the genera and section of the Pupininæ.

SUB-FAMILY PUPININÆ.

Genus **Pupina** Vignard, 1829.

Shell pupiform, or shaped like a Pupa, shining, glossy, sometimes transparent, epidermis in some species resembling a thin coat of varnish, peristome strong or reflected, mouth round, operculum circular, thin, membranous, underside flat, with a central nucleus.

Distribution: Indo-China, Japan, Malaysia, and Australia.

Section PUPINA sensu stricto (*Eupupina* L. Pfeiffer, 1876).

The edge of the columella with a transverse slit or channel to the middle, and a second channel near the insertion of the parietal whorl.

Type *P. keraudreni* Vignard.

This is by far the most numerous section, as according to Paetel out of sixty-four species that he mentions, although many more species have been discovered since his work was published, more than one-half belong to this section. There is, as you will see, a very considerable difference in the depth and width of these channels or notches. Some of them, as *P. bidentata* of C. E. Beddome from Queensland, and *P. pulchella* of Mildff. from China, have deep and long slits or channels, with strong ribs or thickenings on each side, whilst others like *P. keraudreni* Vignard, from the Caroline Islands, have only very small and slight channels or openings.

Section REGISTOMA Van Hasselt, 1823 (= *Moulinsia* Grataloup, 1841).

The edge of the columella channelled to the middle. The edge of the parietal wall plain.

Type *R. grande* Gray.

Very different from the section Pupina in having only one channel and that at the base of the mouth.

Section BELLARDIELLA T. Canefri, 1883.

Type *B. martensiana* T. Canefri, from New Guinea. Basal channel open at the back behind the peristome.

Section HARGRAVESIA H. Adams, 1870 (= *Hyalopsis* Pease, 1872).

Only one channel at the upper part of the opening.

Type *H. polita* H. Adams, from the Solomon Islands.

Easily distinguished from *Registoma* as the channel is at the upper part instead of the lower.

Section CALLIA Gray, 1840.

Without any channel.

Type *C. lubrica* Sow., from the Philippine Islands.

These four are the sections of what Fischer considers as true *Pupinæ*.

Sub-genus *STREPTAULUS* Benson, 1857.

Shell shining. Peristome round. At the upper part provided with a sutural tooth, open from the interior to the exterior, looking like a siphon.

Distribution: Himalayas.

Type *S. blanfordi* Benson.

The only species of this sub-genus.

Sub-genus *PUPINELLA* Gray, 1850.

Shell covered with a thin epidermis, mouth circular. The edge of the columella channelled at the base, peristome reflected, thick, operculum horny, multispiral.

Distribution: Philippines, Moluccas, Borneo.

Type *P. pupiniiformis* Sow.

Section *PUPINOPSIS* H. Adams, 1866.

A sinus or a tube to the posterior part of the mouth.

Type *P. morrisonia* H. Adams, from Formosa.

Sub-genus *ANALULUS* L. Pfeiffer, 1855 (= *Rhaphaulus* Pfr., 1857).

Shell pupiform, with an epidermis, umbilicated, mouth circular, peristome double, the internal continuous, the external dilated, perforated near the insertion of the right edge by an open channel. The sutural canal open to the interior of the spire, operculum thin, horny, a little concave on the outside.

Distribution: Indo-China, Borneo.

Type *A. bombycinus* Pfr.

According to Michau "*Pupina* (*Registoma*) *vescoi* Mor. lives in Cochin China at the foot of the banana trees and ascends their trunks and foliage after the rains."

Benson says "The canal of the shell of *Anaulus* serves to maintain a communication with the outside air when the opening is closed by the operculum."

In the Cambridge "Natural History," (p. 157) the Rev. A. H. Cooke says "In certain genera of land operculates, e.g., *Pupina*, *Cataulus*, *Pterocyclus*, a slight fissure or tube in the last whorl serves to introduce air into the shell, which is perhaps otherwise closed to air by the operculum. In *Aulopoma*, which has no tube, the operculum admits free circulation of air. In certain other Cyclostomatidae the apex is truncated and air can enter there. De Folin closed with wax the aperture of *C. elegans* and found that on placing it in a pneumatic machine the shell gave off air through its whole surface. On the other hand *Cylindrella* and *Stenogyra decollata*, on being submitted to the same test, shewed that the truncated part alone was permeable by air."

Genus **Hybocystis** Benson, 1859 (humpbacked sack).

Shell oval, pupiform. The last whorl but one very large, flat on the ventral face, mouth circular or oval-angular, peristome double, reflected, thick, lip continuous to the upper part, operculum calcareous, concave on the outside, with a central nucleus.

Distribution: Indo-China.

Type *H. gravida* Benson.

Genus **Cataulus** L. Pfeiffer, 1851 (spread out).

Shell perforated, pupiform, with a pointed apex, at the lower part surrounded by a narrow keel, mouth complete, prolonged at the base by the opening of a trench or gutter, almost circular, peristome dilated at the base, by the keel of the last whorl. Operculum horny, orbicular, flat, multispiral, separable into several lamellæ, nucleus central. Twenty-one species, all in Ceylon, except four from Southern India.

Type *C. pyramidatus* Pfr.

Section TORTULOSA Gray, 1847.

Last whorl detached. Nicobar Islands?

Type *T. tortuosus* Chemnitz.

Genus **Coptocheilus** Gould, 1882 (notch-lip).

Shell subperforate, pupiform, with a pointed spire, mouth complete, subcircular, peristome double, the internal sometimes subcanaliculate near to the base of the columella, the internal dilated, operculum horny, multispiral.

Distribution: Philippines, Borneo, Indo-China.

Type *C. altum* Sow.

This genus comprises the species from Asia and Malaysia which were formerly placed in the genus *Megalomastoma*.

Genus **Megalomastoma** (Guilting) Swainson, 1840
(large mouth-brim).

Shell hardly perforated, oblong turricular or pupiform, apex truncated, opening subcircular, peristome reflected, rather thin, frequently double, operculum horny, circular.

Distribution: Antilles.

Type *M. antillarum* Sow.

Section FARCIMEN Troschel, 1847.

Peristome thick, reflected, simple.

Type *M. cylindraceum* Chem.

Sub-genus TOMOCYCLUS (Crosse and Fischer), 1872.

Shell turricular, truncated, opening sub-circular, peristome double, the outer one largely dilated, foliaceous, the upper edge interrupted and notched. Distribution: Guatemala.

Type *T. gealei* Crosse & Fischer.

Since writing the above I have, through the kindness of Mr. Ponsonby, seen a copy of "The Cyclophoridae" by Dr. Kobelt, published in July, 1902, and he separates *Megalomastoma* from *Pupina* and makes of it a separate sub-family, Megalomastomateæ.

The sub-family Pupininæ he divides into two sections, viz.: Pupinelleæ and Pupineæ.

The following are the genera:—

Section I. PUPINELLEÆ.

Genus 1.	<i>Pseudopomatias</i> Mlldff.	-	-	6 species.
" 2.	<i>Rhaphaulus</i> L. Pfr.	-	-	8 "
" 3.	<i>Streptaulus</i> Benson	-	-	1 "
" 4.	<i>Schistoloma</i> Kob. (= <i>Coptocheilus</i> Gould).	-	-	11 "
" 5.	<i>Tortulosa</i> Gray. (= <i>Cataulus</i> L. Pfr.).	-	-	2 "
Sub-genus A, <i>Eucataulus</i> Kob. 21 species.				
"	B, <i>Tortulosa</i> Gray	1	"	—22 "
" 6.	<i>Pollicaria</i> Gould (= <i>Hybocystis</i> Bru.).	-	-	5 "
" 7.	<i>Pupinella</i> Gray.			

Sub-genus A, *Pupinella* Gray 25 species.

"	B, <i>Pupinopsis</i> H. Ad.	4	"	—29 "
" 8.	<i>Bellardiella</i> Tapp.	-	-	3 "
" 9.	<i>Hedleya</i> Cox	-	-	1 "

Making 88 species of *Pupinelleæ*.

Section II. PUPINEÆ.

Genus 1. *Pupina* Vignard.

Sub-genus A, *Pupina* Vignard 14 species.

"	B, <i>Tylotæchus</i> Kob. & Mlldff.	72	"	
"	C, <i>Siphonostyla</i> Kob.	2	"	—88 "
" 2.	<i>Hargravesia</i> H. Adams	-	-	5 "
" 3.	<i>Moulinisia</i> Grat. (= <i>Registoma</i> Van Hasselt).	-	-	17 "
" 4.	<i>Porocallia</i> Mlldff.	-	-	6 "
" 5.	<i>Callianella</i> R. B. Newton (= <i>Callia</i> Gray).	-	-	5 "

Making 121 species of *Pupineæ*.

Kobelt separates his section *Pupineæ*, which includes what are considered as true *Pupinæ* into five genera, and the first one, genus *Pupina*, which has two slits or channels in the mouth, into three sub-genera.

Genus **Pupina** Vignard.

Section PUPINA Vignard.

Shell smooth, glossy, channels simple, the lower one like a slit in the rim, the upper one in some cases like a small semi-circular depression in the callus near the insertion of the parietal wall.

Section TYLOTÆCHUS Kob. and Mlldff.

The upper canal formed between a tongue or strong rib on the callus and the edge of the parietal wall, which is sometimes much straightened.

Section SIPHONOSTYLA Kob.

The lower canal striking out and ascending the outside, covered with a thickening or callosity.

Two species, which I have never seen.

Genus **Hargravesia** H. Adams.

Shell with only the upper channel or slit.

Genus **Moulinsia** Grat.

(=*Registoma* Van Hasselt).

Shell with only the lower canal, which breaks through the edge with a narrow slit, but is wider below, and often looks like a circular hole.

Genus **Porocallia** Mlldff.

Shell as the next genus *Callianella*, without any slit, but with a small pore or opening behind the mouth-edge.

Six species, none of which I have seen.

Genus **Callianella** R. B. Newton.

Shell without any slit or channel.



Report on the Fleetwood Ramble.—Attracted by former accounts of the richness of the molluscan fauna of this part of the Lancashire coast, it was agreed upon to visit it on August 13th last. Having arrived at Fleetwood we at once crossed over the ferry to Knott End, where an hour or so was spent on the break-water in search of shells. The chief attraction was *Acunea testudinalis*, recorded from there as being its southern limit. This we failed to find, but were rewarded with quantities of *Purpura lapillus* var. *imbricata*, great numbers of which were depositing their curious egg-capsules under the ledges of rock. A fair number of specimens of *Chiton cinereus* (= *marginatus*) were found, as well as specimens of *Littorina littorea*, *L. rudis*, and *L. obtusata*, the two latter species varying in colour. *Patella vulgata* was fairly common on the stones, and numerous valves of *Cardium edule*, *Scrobicularia plana* (= *piperata*), and *Macoma balthica* were lying about on the mud flats, where large quantities of *Mytilus edulis* were noticed also.—J. WILFRID JACKSON (*Read before the Society*, September 14, 1904).

W. D. CRICK, F.G.S.

By CHAS. OLDHAM.

(Read before the Society, September 14, 1904).

By the death of Mr. Walter Drawbridge Crick, at Northampton, on December 23rd, 1903, at the early age of forty-six, we have lost an enthusiastic conchologist, who was elected a member of the Society so long ago as March, 1886. Crick, who was born at Hanslope, in Buckinghamshire, on December 15th, 1857, evinced as a school-boy the scientific tastes which he was able to cultivate when he moved to Northampton, where the greater part of his life was spent. Here, as a young man, he attended classes in chemistry and geology, and afterwards devoted much of his leisure to the study of geology and conchology in the field. The demands made upon his time by a large business—he was engaged in the staple trade of Northampton, and at the time of his death was the head of an important boot and shoe manufacturing firm—restricted his active field work in later years; but his love for natural science did not decrease, whilst the catholicity of his tastes is shewn by his knowledge of microscopy and archæology, and his interest in books and book-plates, coins and prints, of which he was a judicious collector. He was elected a member of the Geologists' Association, London, in 1886, and a fellow of the Geological Society of London in 1892. During the eighties and early nineties he visited geological sections in all parts of Northamptonshire and the neighbouring counties, collecting fossils, particularly gastropods, a class of molluscs which had a special attraction for him. His name is associated with *Mathilda cricki* Hudl., and *Trochus cricki* Wilson. As a conchologist he was primarily a collector, but that he did not neglect the more philosophical aspects of the science is apparent from a letter of Darwin's, published in *Nature*, only a few days before his death, in which reference is made to some observations of Crick's on the dispersal of freshwater bivalves. He was for many years President of the Conchological Section of the Northamptonshire Natural History Society, to whose proceedings he contributed several papers on conchological and palæontological subjects. His sole communication to the *Journal of Conchology* was a note on *Achatina acicula* in Northamptonshire (vol. 5, p. 151). Crick was a man of a fine presence and a hearty, genial manner. His kindly nature and integrity of character, coupled with an unbounded enthusiasm for whatever work he took in hand, won the esteem of all who knew him.

THE CYPRÆIDÆ OF THE PERSIAN GULF, GULF OF
OMAN, AND NORTH ARABIAN SEA,
As Exhibited in Mr. F. W. Townsend's Collections, 1893-1904.

By JAMES COSMO MELVILL, M.A., F.L.S., & ROBERT STANDEN.

(Read before the Society, May 11th, 1904).

THE following list is a fuller exposition of its subject than was given in the first Catalogue of the Cypræidæ of the Persian Gulf and Arabian Sea, published in 1901.¹ Since that date Mr. Townsend has been very successful in obtaining a few species new to the region, as well as at least two striking varieties. Of some species, e.g., *C. ovata* Perry (= *turdus* Lam.), *C. ocellata* L., and *C. pallida* Grey, the suites of specimens are exceedingly ample, and every possible shade of variation, in colour, texture, form, and dentition, is present. Of others, e.g., *C. erosa* L., so common in Indian seas further south hardly an example has been obtained. With the exception of the "Brindled Cowry of the Persian Gulf," *C. princeps* (= *valutia* Perry), which it is not yet certain really came from this area, we think all the *Cyprææ* that are to be found in the region are amongst Mr. Townsend's superb gatherings.

The same symbols and abbreviations are here used as in our previous papers, e.g. :

I.—P.G., signifying Persian Gulf, inclusive of the Gulf of Oman, with Maskat and Jask, bounded eastwards by long. 59° 40' E.

II.—M.C., Mekran Coast of Persia and Beluchistan, between long. 59° 48' E., and R. Hab.

III.—1. India, meaning at this present opportunity merely the environs of Karachi Harbour, for we do not propose to include now any Cypræidæ that have not been personally dredged or collected by Mr. Townsend, and accordingly make no mention of Bombay, Retuagiri, or Paugina, as on former occasions.

We may add, that Mr. Townsend, since returning to England, has personally gone through his collection with us, and for much of the additional information now given we are indebted to him.

Cypræa annulus L.

P.G. Gulf of Oman, Maskat.

Very abundant, and from thence exported to India as an article of commerce (F.W.T.).

I. Karachi. A single dead specimen only occurred (F.W.T.).

Cypræa arabica L.

P.G. M.C. Generally common, principally occurring under rocks at low tide.

I. Fairly common at Karachi. All the specimens from thence, though fine, are slightly malformed, with conspicuous waterbreaks. Most of the specimens are small, but there is also a large form from Maskat, with the white dorsal patches remarkably distinct and quadrate. Var. *histris* Meusch. also occurs in considerable numbers.

Cypræa carneola L.

P.G. Four, somewhat thin and inflated, one being especially tumid and fore-shortened. Remarkably light forms also occur at Shaikh Shuaib Island and Henjam Island, while from Liujah at $3\frac{1}{2}$ fathoms dark examples were dredged alive, spirally four-banded with chocolate, and with lilac annulus just beyond the columellar and labial callosities extending dorsally. Found from low-tide mark to 3 faths.

M.C. Two from Charber. Two from Jask, on the border of P.G., very dark.

I. Rare in the district. Four from Karachi only, small, but adult. It is evident that this species hardly thrives in any of these localities.

Cypræa caurica L.

P.G. Common in shoal-water amongst rocks. Fine, well-developed specimens. One, quite adult, but dwarfed, similar to typical examples in disposition of markings.

M.C. Very rare, have only dredged four examples in eight years (F.W.T.).

Var. **oblongata** Melv. (*cf.* Kiener, "Icon. Cypræa," pl. x., fig. 3). Rare in this region.

I. Three from Karachi very finely marked and fresh, of high polish; base flesh-coloured; dorsal surface with golden-brown suffusion, centrally blotched with bright sepia. Another smaller example is paler, dorsally slightly recalling *C. tabescens*.

Var. **cairnsiana** nov.

I. Karachi. A very fine example, surpassing in coloration others of this same variety from Borneo and the East Indies.

Curtly abbreviate in form, roundly ovate, laterally somewhat thickened, extremely polished; dentition, labial, and columellar teeth about 17-18, pale flesh-coloured, the interstices and most of the basal surface bright carnation or orange-red; basal and lateral spots tinged with violet; dorsal surface grey, suffused with close brown flecking, lateral spots large, extremities carnelian.

This variety, which we dedicate to Mr. Robert Cairns, of Hurst, Ashton-under-Lyne, whose fine collection of *Cypræa* is so well known, is precisely to the typical form of *caurica* what *coloba* Melvill (= *gregori* Ford) is to *cruenta* Gmel. It is, however, far more infrequent. By their varieties the two species are linked closely together, though not sufficiently to bear the suggestion that they

might be merged in one. It is always possible to define them, in our opinion.

Cypræa erosa L.

P.G. Rare, but widely distributed. Found usually on muddy sand, near rocks, at low water, to seven fathoms.

The largest specimen comes near var. *phegedina* Melv.

Var. **nebrites** Melv.

M.C. One very fine example. Charbar, five fathoms.

This variety, were it not for the lateral blotches, which are more than usually pronounced, might be considered a form of *ocellata* L., almost identical with var. *palatha*.

Cypræa felina Gmel.

P.G. Gulf of Oman, Maskat.

M.C. Rare. Found at half-tide mark, never much below that, under rocks.

Var. **fabula** Kiener.

P.G. Gulf of Oman, Maskat, Charbar.

Very finely coloured and large.

In the survey of *Cypræa* the variety was given specific rank. Having seen of late years some intermediates, we think its right arrangement is as above.

Cypræa fimbriata Gmel.

P.G. E. Dabai.

Generally found among coral-sand and algæ, at from five to ten fathoms.

M.C. Charbar. Not yet found eastward of this place (F.W.T.).

Var. **macula** Ad. (sp.).

P.G. Occurs with the type.

C. hirundo L.

P.G. Fine examples, accidentally mixed with *fimbriata*, and so excluded from our last enumeration.

Cypræa lamarckii Gray.

Three small, but typical examples, from Karachi.

Cypræa lentiginosa Gray.

P.G. Shaikh Shuaib Island, five to ten fathoms, coral and stones, Dabai.

M.C. Locally general.

Jask, seven fathoms.

I. Karachi.

This select species is found locally plentiful in the above localities, especially in the Persian Gulf, the forms obtained for the Telegraph Cable are of lighter texture and more graceful form, slightly pyriform,

than the heavier, darker, laterally thickened Karachi examples, but these two extremes are insensibly joined by intermediates.

Cypræa listeri Gray.

P.G. Gulf of Oman : Ras el Hadd, near Maskat. Rare.

Cypræa mauritiana L.

P.G. Gulf of Oman, Maskat.

Obtained from the natives, who said they had found them on rocks at extremely low tide (F.W.T.).

Cypræa moneta L.

P.G. Gulf of Oman, Maskat.

Exported in quantity to India, along with *C. annulus* L. These two so-called species are probably but the extremes of one variable mollusc.

Cypræa ocellata L.

P.G. M.C. I.

The finest series, probably, that has ever been collected, numbering many hundred examples, arrived from Karachi in greater part, some from other portions of the Mekran coast, and from Dabai, Persian Gulf.

The variation is considerable ; from the simple normal oval shell, with speckled or lineate base, dorsally-coloured fulvous or raw sienna, flecked with close round white spots, many eyed, to the large, very highly coloured form, with unusual suffusion, intensified dottings and ocellations, which constitutes the var. *calophthalma*.

The chief variation, however, consists not so much in form as in colour. A pale pinkish-livid or grey shell, from Karachi, is most peculiar and remarkable. In form and marking it is as the type ; the basal lineations are faint, but normal. The colour, however, shows no trace of brown. This very rare variety we propose to designate as var. *pelidna* (πέλιδνος, livid).

The form with the ocelli absent (*palatha*) has only, so far, occurred once in the Persian Gulf.

Two particularly dwarfed examples were dredged, lat. 18° 58' N., long. 71° 45', 40 fathoms.

Cypræa onyx L.

P.G. Adhering to the telegraph cable from fifteen fathoms, mud, principally at the head of the Gulf. Between Bushire and Fao, on the telegraph cable, ten to twenty fathoms. Var. *adusta* only.

I.—Karachi; occurs very sparsely. Type absent, vars. *adusta* and *succinata* are about equally represented.

Cypræa pallida Gray.

P.G. M.C. I.

Generally distributed over the whole area. Many hundred fine examples, mostly from Karachi, or Dabai, Persian Gulf, exhibit the following variation, linked by intermediate forms.

(a). Dorsal surface pale blue-grey, or cinereous, mottled indistinctly with brown, dorsal blotch often quite absent: laterally spotted.

(b). Dorsal surface golden-brown, beautifully centrally-blotched with umber, literally suffused with very dark brown or grey.

Every intermediate gradation seems to occur.

Cypræa pulchella Sow.

Var. **pericalles**, nov. (περικαλλης, very beautiful).

Shell uniformly smaller, very polished, in form like the type, dorsal markings similar, and as variable, with occasional dark sepia blotches, more or less distributed in various examples, labial teeth 19-22, typical, columellar teeth not extended far over the base, but more so than in the allied *pyriformis* Gray. The sequence would seem to be:

C. pulchella Swn.

var. *pericalles* M. & S.

C. pyriformis Gray.

var. *smithii* Sowb. (Smaller than type, labial teeth suffused with red, otherwise as in *pyriformis*).

C. pyriformis typica.

P.G. Four miles north of Barkha Island, at forty fathoms.

Gulf of Oman. Telegraph Cable, from fifty fathoms, mud. Off Mussandam, on the cable, forty-seven fathoms; also from Fao, on the cable, fifteen fathoms, a young shell.

Typical *C. pulchella* has not, so far, occurred.

Kiener figures the var. *pericalles* ('Genre Porcelaine,' pl. xxiii., fig. 2a) mentioning it as the young form (p. 26). Our specimens, twelve or more in number, are, however, mostly adult, exhibiting a dwarf race of this very beautiful and still uncommon species. The average dimensions are long. 32 mm., lat. 18 mm., as contrasted with typical *pulchella* in our collections from China, whose measurements are: max., long. 46 mm., lat. 26 mm.; min., long. 37 mm., lat. 22 mm.

Cypræa pulchra Gray.

P.G. Shaikh Shuiab Island. Not hitherto found alive here.

Mussandam, Elphinstone Inlet. One very large living specimen (1903). Long. 55 mm. Lat. 32 mm. This fine example is of a plain shining dun colour dorsally, (cf. Kiener, Ic., pl. xv., f. 3).

Gulf of Oman.

A dark fawn-coloured example, with semipellucid appearance was dredged off Nuyat at seven-ten fathoms.

Cypræa ovata Perry (Conch., pl. xxi., fig. 3, 1811).

Cypræa turdus Lam. (Anim. sans Vert., vii., p. 392, 1822).

P.G. M.C. I.

Everywhere in the greatest plenty and variety: a remarkable series of the species, several hundreds in number, exhibits all the limits of variation.

When young the dorsal surface is generally dark cinereous brown, the shelly deposit, especially laterally, being thin and unformed. Later, when full growth is attained, the sides have a whitened callous appearance, the deeper coloured maculations only being partly visible.

Cypræa ovata seems to vary chiefly

(a) in size: the following are maximum and minimum measurements—long. 53, lat. 35 mm.; long. 22, lat. 15 mm.

The large pyriform examples (*pyriformis* Sowb.) mainly come from Karachi. Further west, especially in the Persian Gulf, the form is stunted, incrassate, ovate, the colouring bluish grey, occasionally white (*nivea* Gray). The base in fresh specimens is often tinged with extremely pale pink.

The most frequent cowry of the region, it abounds principally amongst Pearl Oysters, with *C. lentiginosa* Gray, and *C. fimbriata* L.

Cypræa talpa L.

P.G. Maskat.

Very rare: we have only seen one example from the above locality, brought in by fishermen.

Cypræa ziczac L.

P.G. Thumb Island, Gulf of Oman, Maskat. Muddy sand and stones at seven to fifteen fathoms; very beautiful varieties occur but the species is always rare.

Trivia globosa Gray.

P.G. Gulf of Oman. Lat. 24° 58' N., Long. 56° 74' S., 156 fathoms. Rare.

I. Lat. 18° 58' N., Long. 71° 45' E. Forty fathoms. Rare.

Trivia oryza Lam.

I. Karachi. Rare.

Trivia scabriuscula Gray.

P.G. Gulf of Oman. Malcolm Inlet.

Dead examples at twenty-four fathoms, mud. Lat. 24° 57' N., long. 57° 59' E., thirty-seven fathoms, sand and mud.

PROCEEDINGS OF THE CONCHOLOGICAL SOCIETY OF GREAT BRITAIN & IRELAND.

332nd Meeting, June 8th, 1904.

Mr. Edward Collier (vice-president) in the chair.

Donations to the Library announced and thanks voted :

The usual periodicals received in exchange.

Candidates Proposed for Membership.

Alexander Frew, M.B., C.M., 12, St. James Terrace, Hillhead, Glasgow.

C. A. Benn, B.A., F.G.S., Pudleston Court, Leominster.

Rev. W. A. Shaw, Hazelbeech Rectory, Northampton.

Papers Read.

"The Conchological Differences between the various Genera and Sections of the Sub-Family Pupininae," by Edward Collier.

"*Testacella scutulum* in Worcestershire," by J. Madison.

"Scalariform *Natica catena*," by Bartlet Span.

Resignation.

G. A. Booth.

Exhibits.

By Mr. J. Madison : *Testacella scutulum*, from King's Norton, Worcestershire.

By Mr. R. Standen : *Tortulosa tortuosa* Chem., Nicobar Islands ; *Fusus polygonoides* Lam., Red Sea ; *Rapa bulbosus* Wood, Port Elizabeth, South Africa ; and *Columbarium pagoda* Less., Nagasaki, Japan ; a fine series from the Manchester Museum collection.

By Mr. J. D. Dean : *Sepioida scandica*, from Southport, also coloured drawings of the same from life.

By Mr. J. W. Jackson : Fine series of *Pomatias elegans*, and var. *ochroleuca*, *Clausilia bidentata* and var. *cravenensis*, *C. laminata*, *Jaminia cylindracea*, *Vertigo pygmaea*, *V. pusilla*, *V. substriata*, *Sphyradium edentulum* and var. *columella*, *Ena obscura*, *Vitrea cellaria*, *Euconulus fulvus*, *Punctum pygmaeum*, and *Acanthinula aculeata*, all from Silverdale, Lancashire.

By Mr. C. H. Moore : *Hygromia concinna*, *Physa fontinalis*, *Planorbis albus*, and *Limnaea truncatula* from Compstall and Romiley ; *Vitrea alliaria* and var. *viridula*, *V. nitidula*, *V. crystallina*, *Zonitoides excavatus*, and *Vivipara vivipara*, some of these, though adult, did not contain embryos, query, males—all from Bardsley ; *Acroloxus lacustris*, *Pisidium obtusale*, *P. gassiesianum*, and *Physa fontinale*, from Middlewood ; *Helix nemoralis* var. *roseolabiata* and *Cecilioides acicula*, from Miller's Dale.

A very fine series of the genus *Pupina* and its allies were shewn by Mr. Edward Collier and Mr. R. Cairns. The specimens from the "Layard" and general collections in the Manchester Museum were also exhibited.

333rd Meeting, September 14th, 1904.

Mr. Edward Collier (vice-president) in the chair.

Donations to the Library announced and thanks voted :

"L'influenza dei mezzi come causa di variazioni e di dispersioni nei molluschi," by Dr. R. Bellini (*from the author*) ; "Handbook to the Natural History of Cambridgeshire," by J. E. Marr and A. E. Shipley (*from the secretary*) ; and the usual periodicals received in exchange.

New Members Elected.

Alexander Frew, M.B., C.M., 12, St. James Terrace, Hillhead, Glasgow.

C. A. Benn, B.A., F.G.S., Pudleston Court, Leominster.

Rev. W. A. Shaw, Hazelbeech Rectory, Northampton.

Candidate Proposed for Membership.

Sir Charles Eliot, K.C.M.G., Government House, Mombasa, East Africa.

Member Deceased.

The death was reported of Dr. Eduard von Martens, of the Museum für Naturkunde, Berlin, elected an Honorary Member of the Society in 1886.

Resignation.

C. H. Morris.

Papers Read.

"W. D. Crick, F.G.S. : Obituary Notice," by Charles Oldham.

"Obituary Notice of Philip Brookes Mason," by the Rev. Chas. F. Thornehill.

"Re-establishment of *Limax tenellus* as a British Species," by W. Denison Roebuck, F.L.S.

"On some Questions of Nomenclature," by A. J. Jukes-Browne, F.G.S.

"Radnorshire Slugs," by W. Denison Roebuck, F.L.S.

"Report on the Fleetwood Ramble," "Report on the Miller's Dale Ramble," by J. Wilfrid Jackson.

Exhibits.

By Mr. T. H. Platt : *Helicigona arbustorum*, *Helix hortensis* and *Planorbis corneus*, from Castle Hill, Scarborough ; *Anodonta cygnea* and *Bithynia tentaculata* from Cheadle, Staffs. ; *Zirphea crispata*, very small specimens in situ in a lias limestone boulder, from Whitby.

By Mr. J. W. Baldwin : A fine series of varietal forms of *Helix pisana*, *Helicella virgata*, and some interesting scalariform examples of *Helicella caperata* and *H. virgata*, from Tenby, 1904.

By Mr. C. H. Moore : A large series of marine and terrestrial shells, from Tenby, collected during a recent visit.

By Mr. W. J. Hall : A series of *Helicigona arbustorum*, type and vars. *fuscescens* and *flavescens*, also a number of *Pupa* and *Clausilia*, from the Jura Mountains, collected July, 1904, at an altitude of 3,000 to 3,500 feet.

By Mr. R. Standen : *Paludestrina jenkinsi*, collected by Mr. G. Shrubsole from the Monmouthshire canal and a ditch at St. Brides, near Newport, Mon.

By Rev. Canon Horsley : *Helicigona arbustorum* var. *canigonensis* from a restricted habitat a few yards square, where it occurs with type and other varieties, near Dover, 1904.

By Mr. J. Wilfrid Jackson : Series of *Purpura lapillus* var. *imbricata*, shewing variation in colouring and size, *Littorina littorea*, *L. obtusata*, *L. rudis* (vars.), *Patella vulgata*, series of embryonic shells of *L. rudis*, taken from the oviduct of specimens when cleaning, all from Knott End, Fleetwood. Large specimens of *Patella vulgata* and *Littorina littorea*, from Larne Harbour, Ireland, for comparison with above. *Helix nemoralis* m. *sinistrorsum* (dead) from Ballycastle, County Antrim, Ireland.

By Mr. Edward Collier : *Succinea oblonga*, *Vertigo moulinsiana*, *Limnæa truncatula* var. *elegans*, very large and occurring with the above, from Braunton Burrows ; *Ancylus fluviatilis* var. *albida* and a sinistral *Helicella caperata*, from Woolacombe, North Devon, August, 1904.

By Rev. C. Chichester : *Testacella haliotide*a from his garden at Barnstaple.

By Mr. C. Oldham : *Paludestrina jenkinsi*, 'beautifully clean and very large specimens, *Valvata piscinalis* var. *antiqua*, Great Budworth Mere, Cheshire, *Helicogona arbustorum*, Marianglas, Anglesea, *Limnæa stagnalis* var. *fragilis*, and *Succinea putris*, both from Llyn Coron, Anglesea.

By Mr. P. H. Grierson : *Vitrina pellucida* var. *depressiuscula*, Collon, County Louth; *Planorbis nautilus* and var. *crista*, many examples having two-thirds of the last whorl disunited, also *P. parvus*, including one scalariform example, Ennis-kerry, County Wicklow.

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- "On the Mollusca procured during the 'Porcupine' Expeditions, 1869-70, Supplemental Notes, part 1,"** by E. R. SYKES (*Proc. Malac. Soc.*, vol. 6, part 1, March, 1904, pp. 23-40, pl. 3. [List of species belonging to genera not treated by Jeffreys; *Retusa marshalli*, *Cylichna obscura*, nn. spp. figured].
- "Descriptions of Twenty-three Species of Gastropoda from the Persian Gulf, Gulf of Oman, and Arabian Sea,** dredged by Mr. F. W. Townsend, of the Indo-European Telegraph Service, in 1903," by J. COSMO MELVILL (*Proc. Malac. Soc.*, vol. 6, part 1, March, 1904, pp. 51-60, pl. 5).
- "Berthais gen. nov."** [for *Scala intertexta* Melvill and Standen, and *Onobia egregia* A. Ad.]; **"Note upon *Oliva gibbosa* Born, and its Limits of Variation,"** by J. COSMO MELVILL (*Proc. Malac. Soc.*, vol. 6, part 1, pp. 61-65).
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- "On a small collection of Marine Shells from Surprise Island,"** by E. R. SYKES (*Journ. Malac.*, vol. 10, part 4, pp. 137-138, 1903. [List of 52 spp., with brief notes].

"**Description of *Marginella lateritia* n.sp., from the Andaman Islands,**" by J. C. MELVILL and E. R. SYKES (*Proc. Malac. Soc.*, vol. 5, part 6, October, 1903).

"**List of the Marine Mollusca recorded as found in Suffolk,**" by the Rev. CARLETON GREENE (*Suffolk Inst. Archaeol. and Nat. Hist.*, vol. 2, pt. 3, 1903).

"**New Molluscan Genera from the Carboniferous,**" by GEORGE H. Girty (*Proc. U.S. Nat. Mus.*, vol. 27, pp. 721-736, pls. 45-47, 1904). [*Limipecten*, *Pleurophorella*, *Clavulites*, *Schuchertella*].

"**Mollusca,**" by E. R. SYKES, assisted by E. A. SMITH (*Zoological Record*, vol. 40, 1903).

The Nautilus, vol. 18, nos. 1-5, May-September, 1904.

"Two new species of *Pleurotoma* [*P. (Genota) stearnsiana*, *P. (Antiplanes) catalinae*], from California," by W. J. RAYMOND. "Descriptions of new Japanese Land Shells," by H. A. PILSBRY and G. HIRASE [*Eulota eminens*, *Punctum elachistum*, *P. apertum*, *Zonitoides chishimanus*, *Macrochlamys chaunax*, *Tornatellina monodonta*, *Carychium nipponense*, *Alycaeus oshimanus*, *Stenothyra formosana*, *Melania hahajimana*]. "A singular Eocene *Turbinella* [*T. (Psilocochlis) McCallie*], by W. H. DALL. "New Varieties of American Limnæas," by F. C. BAKER. "*Limax maximus* L. in California," by P. BARTSCH.

"On the Generic Position of *Teredo fistula* H. C. Lea," by C. W. JOHNSON [belongs to *Teredina*]. "A new species of *Pleurotoma* [*P. (Genota) riversiana*], from the Pliocene of California," by W. J. RAYMOND. "Notes on Eastern American *Ancylis*, II.," by BRYANT WALKER [*Terrissia rivularis* (Say), figured]. "A Dredging Trip to Santa Catalina Island," by H. N. LOWE [list of about 150 spp.]. "Notes on a few Shells," by C. F. ANCEY [criticisms of newly-proposed species].

"Notes on Eastern American *Ancylis*, II.," by BRYANT WALKER [figures of several species]. "A new *Omphalina* [*O. pilsbryi*] from Alabama," by GEORGE H. CLAPP. "A Molluscan Stampede," by T. VAN HYNING [*Physa gyrina* in large numbers leaving a stream and going into a hole from which a spring issued]. "Descriptions of new Japanese Land Snails" [*Eulota irredivia*, *E. tokunoshimana*, *E. pressa*], by H. A. PILSBRY and Y. HIRASE. "*Limax maximus* and other Slugs in California," by R. E. C. STEARNS.

"List of Alabama Shells collected in October and November, 1903," by A. A. HINKLEY [annotated list]. "The Land Shells of Ironbound Island, Maine," by D. BLANEY [24 spp.]. "Notes on some Cape Cod Mollusca," by C. W. JOHNSON.

"South-western Shells," by J. H. FERRISS [narrative of collecting trip; *Ashmunella walkeri*, *Oreobelix clappi* nn.spp.]. "List of Alabama Shells collected in October and November, 1903," by A. A. HINKLEY. "The Cambridge Natural History: Errata Corrected," by R. E. C. STEARNS. "*Plectopylis* in the Riukiu Islands," by H. A. PILSBRY [*P. (Sinicola) hirasei*, n.sp.]. "A new Lower Californian *Sonorella* [*S. lohrii lioderma*] by H. A. PILSBRY. "A new locality in South Carolina for Recent and Fossil Mollusks," by FRANK BURNS [Myrtle Beach].

Journal de Conchyliologie, vol. 52, no. 1, June, 1904.

"Quatrième Contribution à l'étude de la Faune Malacologique du Nord-Ouest de l'Afrique," by PAUL PALLARY [annotated list and numerous new spp. figured]. "Remarques sur le *Columbella terpsichore* Sowerby et sur l'*Euchelus erythraensis* Sturany," by H. FISCHER [former = *Attilia fauroti* Jousseaume, latter = *Clanculus gennesi* H. FISCHER].

Nachrichtsblatt der Deutschen Malakozoologischen Gesellschaft, part 3, July-September, 1904.

"Streifzüge in Süditalien," by W. KOBELT. "Ueber einige von Herrn. G.

Paganetti-Hummler entdeckte Höhlenschnecken," by R. STURANY [*Serrulina collasi* n.sp., Corfu, *Pholeoteras* n.g. for *P. euthrix*, n.sp. Herzegovina]. "Ueber Kreta-Mollusken," by R. STURANY [*Clausilia holtzi*, n.sp., figured]. "Eine neue Form der Palludinidengattung *Emmericia* im Mainzer Becken," by O. BOETTGER. "Beiträge zur Kenntnis der Mollusken fauna Dänemarks," by C. A. JENSEN and C. SELL [list from the Söborghus Sö.]. "Eine merkwürdige Abnormität von *Helix pomatia* L.," by W. KOBELT [one-third of the mouth closed by a calcareous mass]. "Verzeichnis der in den Bänden 1-35 des Nachrichtenblattes enthaltenen Arbeiten," by AMALIE KOBELT.

Journal of Malacology, vol. 11, no. 2, July 11th, 1904.

"On a collection of Marine Shells from Port Alfred, Cape Colony," by EDGAR A. SMITH [53 spp. figured, with notes on a few others]. "Note on *Corilla erronella*, Nev., MS.," by G. K. GUDE [redescribed with figure]. "Description of a new species of *Ariunculus* [*A. pallaryi*] from Algeria," by W. E. COLLINGE. "Some recent Slug Papers," by D. F. HEYNEMANN [abstracts]. "Note on *Testacella haliotide* Drap.," by the Rev. A. H. COOKE [habitually crawls on the surface]. "Note on *Parmacella deshayesi* Moq.-Tand.," by W. E. COLLINGE.

Proceedings of the Academy of Natural Sciences of Philadelphia, vol. 55, part 3, October-December, 1903; vol. 56, part 1, January-March, 1904.

"A new American Genus of Arionidæ," by H. A. PILSBRY [*Zacoleus* for *Z. idahoensis* n. sp.]. "A List of Shells collected in Western Florida and Horn Island, Mississippi," by E. G. VANATTA [*Vitrinella mooreana*, *Erycina floridana*, *Cuna dalli* nn. spp. figured]. "Mexican Land and Freshwater Mollusks," by H. A. PILSBRY [numerous new species]. "A new Hawaiian *Limnæa* [*L. hawaiiensis*]," by H. A. PILSBRY.

"New Japanese Marine Mollusca : Gastropoda," by H. A. PILSBRY [numerous species figured]. "The Larval Eye of Chitons," by HAROLD HEATH [observations in development and homology].

Memoirs of the Manchester Literary and Philosophical Society, vol. 48, part 3, 1904.

"A Diagnostic Key to the Genera of Recent Dibranchiate Cephalopoda," by WILLIAM E. HOYLE.

The Naturalist, nos. 569-571, June-August, 1904.

"Lincolnshire Mollusca," by D. M. C. WOODRUFFE-PEACOCK [*Helix nemoralis* v. *libellum*]. "Shells at Hornsea Mere," by T. PETCH [*Pisidium nitidum*]. "*Helix lamellata*, etc., near Scarborough," by W. C. HEY. "Molluscs at Tetney," by THOMAS CASTLE. "Molluscs at Hebden Bridge," by J. E. CROWTHER. "*Paludestrina jenkinsi* in Spen Valley," by THOMAS CASTLE.

The Irish Naturalist, vol. 13, nos. 6-8, June-August, 1904,

"The Mollusca of Bushy Park, Dublin," by R. WELCH and A. W. STELFOX [annotated list of 62 spp.]. "The Common Mussel in Belfast Lough," by Sir ROBERT LLOYD PATTERSON [quantity collected, price and destination]. "Notes on the Mollusca of North Cork and Waterford," by P. H. GRIERSON [list of 72 spp., with localities].

La Feuille des Jeunes Naturalistes, no. 406, August, 1904.

"Faune du Tumulus de Saint-Christophe, près Grasse (Alpes-Maritimes)," by — CAZIOT [2 nn. spp., fossil].



Radnorshire Slugs.—Last year I had several consignments of slugs and snails from Radnorshire, obtained for the purpose of filling up blanks in our knowledge of Welsh mollusca. From Mr. F. Hall, of Bank House, Pen-y-Bont, was received a most valuable series, the interest of which was enhanced by the observations given in his letter. This included a small specimen of *Testacella haliotideae*, a fine and very characteristic adult example of *Limax maximus* var. *ferussacii*, an equally fine one of var. *punctata* with the black spots few and far between, one half-grown of var. *fasciata* of a rich warm shade of brown in the markings, and several juvenile specimens of the typical var. *sylvatica*. Of *Arion ater* there were but one or two very minute young examples of a palish brown colour, a few of *A. circumscriptus*, and numerous typical specimens of *A. hortensis*. The specimens of *Agriolimax agrestis* were numerous, and included one or two of var. *nigra*, and one or two of var. *brunnea* Taylor (which is the same as British collectors have hitherto called var. *tristis*, but not the real *tristis* as originally described). The other specimens were of the two main varieties, the immaculate var. *pallida*, and the maculate var. *reticulata* (which is the correct name for the spotted form which British malacologists have hitherto called *sylvaticae*, but which is not the true *sylvatica* of Draparnaud). There were various shells included in this consignment. A couple of examples of the fine *Hyalinia lucida*, some of *H. nitidula* and *H. alliaris*, one or two *Helix hortensis* var. *lutea* 12345, several of *Hygromia hispida*, and of *Pyramidula rotundata*, and one of *Vitrina pellucida*, all of which have been seen and confirmed by my friend Mr. John W. Taylor. Mr. Hall's letter states that it is the smaller kinds of slugs that are the most destructive, fields being simply covered with them. He mentioned, writing 9th November, that he was unable then to get the large black *Arion ater*, which is common at Pen-y-Bont in the early summer, but he supposed they are now apparently gone into winter quarters. He writes that the large dark-grey shell-snails (meaning *Helix aspersa*) are absent from that side of the county, and that the thrushes give a good account of the *Helix hortensis* to feed their young, after breaking the shells on a stone. Regarding *Testacella*, he mentions that they grow to a good size at Pen-y-Bont, but are scarce. From Mr. L. McKarg, schoolmaster at New Radnor, I received a boxful collected by the boys for me, mostly *Agriolimax agrestis* of the usual two main forms, *pallida* and *reticulata*, but also including a var. *brunnea*, and one or two var. *nigra*. There were several *Arion hortensis*, and what is not included in my other consignments, a few *Limax arborum*, typical and small in size. From Miss E. P. Tudge, of Knighton, I received through the kind intervention of Mr. A. W. Weyman, of Ludlow, a large number of examples of *Agriolimax agrestis* of the usual two main varieties, *pallida* and *reticulata*, and an abundant supply of specimens of *Helix aspersa* var. *flammea*; and from a lady correspondent at Pen-y-Bont, who merely signs her initials H.F.J., I received an abundance of the same forms of *A. agrestis* and several *Arion hortensis*, the largest examples of which were somewhat paler than the others, and all of them with the foot-soles deep yellow. Regarding the *Agriolimax agrestis*, in all the consignments it is to be observed that they are all very deeply coloured, and very few pale ones among them; this intensity of colouring being what is usually observed at this late period of the year. It was for the purpose of being able to colour the map of this species for Great Britain a uniform red that we needed these specimens, and it is a satisfaction to know that we have now seen and authenticated the existence of this ubiquitous animal through all the counties and vice-counties of Scotland, England, and Wales, without one single exception.—W. DENISON ROEBUCK (*Read before the Leeds Branch, and before the Society, September 14, 1904.*)

L. St. G. Byne. J. R. Hardy. J. M. Williams. J. R. B. Masfield. W. E. Hoyle. C. E. Wright. R. Cairns. L. E. Adams. C. Oldham.
T. Edwards. C. H. Moore. R. Drummond. R. Standen.



R. D. Darbishire. E. D. Bostock. W. Nelson. R. F. Scharff. J. W. Taylor. W. D. Roebuck. E. Collier.
J. T. W. North. J. Taylor. J. W. Jackson.

THE CONCHOLOGICAL SOCIETY,

ANNUAL MEETING, OCTOBER 1ST, 1904.

THE
JOURNAL OF CONCHOLOGY.

VOL. II.

JANUARY, 1905.

No. 5.

Constitution & List of Members
OF THE
CONCHOLOGICAL SOCIETY
OF
GREAT BRITAIN AND IRELAND.

- 1.—This Society shall be called "**The Conchological Society of Great Britain and Ireland.**"
- 2.—Its object shall be the promotion of the science of Conchology, by the holding of Meetings for the reading and discussion of original papers, by the publication of proceedings, and by the formation of a Library and Collections illustrative of the science.
- 3.—It shall consist of Ordinary and Honorary Members.
- 4.—Ordinary Members shall be proposed by two Members at one meeting, and balloted for at the next. They shall pay, in advance, on the 1st January in each year, a subscription of 5/-, or may compound for life by the payment of Three Guineas. If on December 31st of any year a member shall be three or more years in arrear with his or her subscription, the Council shall erase his or her name from the list of members, and shall take whatever steps seem desirable for recovery of the arrears. The Council shall further report the erasure of such names to the next meeting of the Society with a view to their publication in the Journal.
- 5.—Composition Fees shall be invested in Books, Cabinets, or other permanent property, or in such other manner as the Council may think most conducive to the benefit of the Society.
- 6.—The number of Honorary Members shall be limited to ten, and they shall be exempt from all payments and have the privileges of Ordinary Members.
- 7.—It shall be governed by a Council, consisting of a President, four Vice-Presidents, a Treasurer, a Secretary, a Curator, a Recorder, a Librarian,

and six other members, who shall be elected annually by ballot; the voting paper issued to be returned to the Secretary, under cover of sealed envelope, addressed to the Scrutineers. The President and Secretary of the Leeds and London Branches and such other branches as may afterwards be accepted at an annual meeting shall, *ex officio*, also be members of the Council of the Society.

- 8.—The Presidency shall not be tenable for more than two years continuously, and the President is expected to give an address.
- 9.—The meetings shall be held monthly, at the time and place fixed by the Council, who shall also have power to arrange such additional meetings as they may think desirable.
- 10.—Three shall be a quorum at all meetings.
- 11.—The Annual Meeting shall be held at such time and place as may be fixed at the previous Annual Meeting, to receive the Reports and Balance Sheet of the out-going Council, and to elect a Council and Officers for the ensuing year.
- 12.—The accounts, before being presented, shall be audited by two members, appointed at a previous meeting.
- 13.—The proceedings shall be published periodically, under the direction of the Council.
- 14.—The Capital and Property shall be vested in two Trustees, elected by the Society.
- 15.—No alterations in the rules shall be made, unless by a majority of three-fourths of the members present at a meeting which has been specially summoned.

LIST OF OFFICERS AND COUNCIL FOR 1904-1905.

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G. W. CHASTER, M.R.C.S.

VICE-PRESIDENTS :

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HON. LIBRARIAN :
F. F. LAIDLAW, B.A.

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E. C. STUMP. C. E. WRIGHT. WILLIAM MOSS.	ALFRED LEICESTER. WALTER E. COLLINGE, M.Sc. J. WILFRID JACKSON.
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SECRETARIES { F. BOOTH,
J. E. CROWTHER.

LONDON BRANCH.

PRESIDENT - REV. J. W. HORSLEY.
SECRETARY J. E. COOPER.

LIST OF MEMBERS.

Corrected to Dec. 31, 1904.

(With year of election; O = founder, or original member; L = Life Member; P = has filled the office of President; *post packets have been returned undelivered).

HONORARY MEMBERS

(Limited to ten in number).

1889. Bergh, Prof. Dr. Rudolph, Vestregade, Copenhagen.
 1889. Binney, Wm. G., 222, E. Union St., Burlington, New Jersey, U.S.A.
 1889. Cossmann, Maurice, 95, Rue de Maubeuge, Paris.
 1897. Dall, Wm. Healey, A.M., D.Sc., Smithsonian Institution, Washington, U.S.A.
 1878. Kobelt, Dr. Wilhelm, Schwanheim, Frankfurt-am-Main.
 O. P. Nelson, William, Gandy Row, Crossgates, Leeds.
 1889. Sars, Prof. G. O., Universitet, Christiania, Norway.
 1889. Simroth, Dr. Heinrich Rudolph, Fichtestrasse 15, I., Leipzig.

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1903. Abbott, G., 83, Russell Street, Kettering.
 1885. P. Adams, Lionel Ernest, B.A., Oak Hill, Chart Road, Reigate, Surrey.
 1899. Appleton, Thos. Alf., M.R.C.S., 46, Britannia Rd., Fulham, London, S.W.
 1895. Arnold, Bernard, F.L.S., Milton Lodge, Gravesend, Kent.
 1886. Baillie, William, Brora, near Golspie, Sutherlandshire.
 1897. Baldwin, D. D., M.A., Hamakuapoko, Maui, Hawaiian Islands.
 1899. Baldwin, Joseph W., 472, Darwen Road, Dunscar, near Bolton, Lancs.
 1895. Barker, Reginald Hawksworth, Grosvenor Bank, Scarborough.
 1886. Barnacle, Rev. H. Glanville, M.A., F.R.A.S., St. John's College, Grimsargh, Preston, Lancs.
 1903. Becher, Major E. F., R.A., 2, Berkeley Villas, Pittville, Cheltenham
 1901. Beeston, Harry, Hawkestone, Havant, Hants.
 1904. Bellini, Prof. Raffaello, R. Scuola Tecnica, Chivasso, Torino, Italy.
 1904. Benn, C. A., B.A., F.G.S., Pudleston Court, Leominster.
 1901. Bentley, R. H., 33, Church Crescent, Muswell Hill, London, N.
 1901. Birley, Miss Caroline, 14, Brunswick Gardens, Kensington, London, W.
 1897. Blackburn, Rev. Ed. Percy, 31, New Road, Driffeld, Yorks.
 1897. Blackmore, Jas. Chanter, F.G.S., Falkirk, Chatley Road, Clifton, Bristol.
 1899. Blackshaw, James C., 158, Penn Road, Wolverhampton.
 1899. Bladen, W. Wells, Stone, Staffordshire.
 1897. Blake, Wm. Charles, 2, Acacia Villas, Ross, Herefordshire.
 1895. Bles, Edward J., B.Sc., Zoological Department, University, Glasgow.
 1897. Bliss, Joseph, Boar Bank Hall, Grange-over-Sands, Lancashire.
 1899. Blundell, Mrs. Jessie M., Argyll House, Cirencester.
 1897. Bolton, Herbert, F.R.S.E., Museum, Bristol.
 1904. Booth, Fred, 43, Victoria Road, Saltaire, Yorks.
 1884. Bostock, Edwin D., Holly House, Stone, Staffordshire.
 1897. L. Boycott, Arthur Edwin, 7, The Square, Carshalton, Surrey.
 1896. Brass, John George, The Grove, Barnard Castle, Durham.
 1879. *Brazier, John, F.L.S., C.M.Z.S., Curaçoa House, 82, Windmill Street, Sydney, N.S.W.

- 1900 *Z* Broadbent, Dr. G. H., 8, Ardwick Green, Manchester.
 1899. Brooksbank, Hugh, M.B., College Road, Windermere.
 1897. *Z* Bullen, Rev. Robert Ashington, B.A., F.G.S., etc., Pyrford Vicarage, Woking, Surrey.
 1896. Burgess, Wm. Valentine, Davenham, Wythenshawe Road, Northenden, Manchester.
 1897. Burnup, Henry Clifden, c/o John Watson, Bracondale, The Avenue, Cambridge.
 1879. Butterell, J. Darker, Manor House, Wansford, Hull.
 1902. Button, Fred. L., 969, Broadway, Oakland, California.
 1888. Byne, Loftus St. George, M.Sc., Ermeffield, Ivybridge, Devon.
 1891. Cairns, Robert, 159, Queen Street, Hurst, Ashton-under-Lyne, Lancs.
 1893. Carphin, Mrs. Janet, 7, Lockerbie Cottages, Liberton, Edinburgh.
 1901. Carter, Chas. S., 8, Bridge Street, Louth, Lincs.
 1878. *P* Cash, William, F.G.S., F.R.M.S., 35, Commercial Street, Halifax
 1903. Cattell, W. Chas., The Poplars, Montagu Street, Kettering.
 1901. Chadwick, Wm. H., Harrogate, Nether Street, North Finchley, London, N.
 1892. Champ, Hy., c/o S. & J. Watts & Co., Portland Street, Manchester.
 1905. Charnley, Jas. Robert, F.Z.S., F.E.S., The Avenue, Moor Park, Preston.
 1895. Chaster, George Wm., M.R.C.S., 42, Talbot Street, Southport, Lancs.
 1887. Chaytor, R. C., Scafton Lodge, Middleham, Bedale, Yorks.
 1904. Chichester, Rev. Charles, Shirwell Rectory, Barnstaple.
 1889. Christy, Robert Miller, F.L.S., Pryors, Broomfield, nr. Chelmsford, Essex.
 1904. Clapp, Geo. H., 325, Water Street, Pittsburgh, Pa., U.S.A.
 1886. Coates, Henry, F.R.S.E., Pitcullen House, Perth.
 1880. Collier, Edwd., Glen Esk, Whalley Range, Manchester.
 1898. Collinge, Walter Ed., M.Sc., University, Birmingham.
 1897. Cook, Rev. Thomas, Whinwood, Westcliff Grove, Harrogate.
 1901. Cooke, Rev. Alfred H., M.A., Aldenham School, Elstree, Herts.
 1892. Cooper, James Eddowes, 68, North Hill, Highgate, London, N.
 1895. Corker, Jas. S., Rose Lea, Mellor Road, Mellor, near Marple.
 1901. Cox, Jas. C., M.D., F.L.S., Sydney, N. S. Wales.
 1890. Crawford, James, c/o J. C. Kemsley and Co., Port Elizabeth, Cape Colony.
 1888. Crouch, Walter, F.Z.S., Grafton House, Wellesley Road, Wanstead, Essex.
 1899. Crowther, J. E., Portland Street, Elland, Yorks.
 1903. Cundall, Jas. W., 3, Orlando Road, Clapham Common, London, S.W.
 1886. DaCosta, Solomon I., 9, Gloucester Square, London, W.
 1897. Dacie, John Charles, 30, Montserrat Road, Putney, London, S.W.
 1904. Dalglish, Gordon, 29, Larkfield Road, Richmond, Surrey.
 1893. Daniel, A. T., M.A., The Grammar School, Uttoxeter, Staffs.
 1903. Darbshire, A. D., B.A., University, Manchester.
 1886. Darbshire, Robert D., High Elms, Victoria Park, Manchester.
 1899. Darnbrough, Frederick, Croft Villa, Eaglescliffe, Yarm-on-Tees.
 1897. Dautzenberg, Ph., 213, Rue de l' Université, Paris.
 1898. Dean, John D., 84, Dale Street, Lancaster.
 1892. Dixon, James Bassett, Ribblesdale House, Preston, Lancs.
 1901. Drummond, Robt., 20, Upper Talbot Street, Blackpool.
 1901. Dyson, W. O., 41, Whiteley Street, Oldham.
 1892. Eccles, John Christopher, 20, Winckley Square, Preston, Lancs.
 1895. Edwards, J. Sumner, Oak Lodge, Harehill Avenue, Leeds.

1895. Edwards, Thos., Cliftonville House, Equity Rd., Narborough Rd, Leicester.
 1901. Edwards, W. H., Hastings Museum, Victoria Institute, Worcester.
 1891. Elgar, Hubert, Museum and Public Library, Maidstone, Kent.
 1904. *L* Eliot, Sir Charles, K.C.M.G., Brockwell, Triangle, nr. Halifax.
 1884. Elliot, Edward J., High Street, Stroud, Gloucestershire.
 1901. Ensor, A. R., 60, Lumley Road, Skegness, Lincolnshire.
 1894. Evans, Wm., F.R.S.E., 38, Morningside Park, Edinburgh.
 1897. *L* Farquhar, John, 3, Rose Terrace, African Str., Grahamstown, Cape Colony.
 1891. Farrer, Captain Wm. James, Chapel House, Bassenthwaite, Keswick.
 1897. Fielding, Clement, M.P.S., Clover Hill, Halifax, Yorks.
 1890. Fierke, Frederick Wm., 73, Redbourne Street, Hull.
 1884. *L* Fitzgerald, Rev. H. Purefoy, Wellington College, Berks.
 1886. Fitzgerald, Mrs. J., Kapai, Maidstone Road, Headcorn, Kent.
 1898. Fitzsimons, J. B., M.D., 14, Owen Street, Hereford.
 1904. Frew, Dr. Alexander, 12, St. James' Terrace, Hillhead, Glasgow.
 1892. Fulton, Hugh, 15, Station Parade, Kew Gardens, near London.
 1887. Gerland, Conrad, M.Sc., Ph.D., F.C.S., Meadow Bank, Accrington.
 1898. Glover, Miss Maria, 124, Manchester Road, Southport, Lancs.
 1886. *L* Godlee, Theo., Whips Cross, Walthamstow, Essex.
 1897. Godwin-Austen, H. H., Lt.-Col., F.R.S., etc., Nore, Hascombe, Godalming, Surrey.
 1902. Gower, Harry D., 55, Benson Road, Croydon.
 1904. Gravely, F. H., Dalton Hall, Victoria Park, Manchester.
 1904. Gray, Arthur A., 509, Exchange Buildings, Boston, U.S.A.
 1886. Greene, Rev. Carleton, M.A., Gt. Barford Vicarage, St. Neots, Huntingdon.
 1904. Grierson, P. H., Land Commission Office, Dublin.
 1901. Gubbins, Mrs., Westwood Ho!, N. Devon.
 1890. Gude, G. K., F.Z.S., 114, Adelaide Road, Hampstead, London, N.W.
 1886. Gwatkin, Rev. Prof. H. M., D.D., M.A., 8, Scrope Terrace, Cambridge.
 1897. Hall, Thos. Bird, Larch Wood, Rock Ferry, Cheshire.
 1902. Hall, W. J., Manchester Museum, University, Manchester.
 1902. Hampson, Travis, Nuthurst, Hartopp Road, Four Oaks, Sutton Coldfield.
 1895. Hann, Rev. Adam, Wesley House, Rochdale.
 1895. Hardy, John Ray, Manchester Museum, University, Manchester.
 1895. Hardy, John, 11, Stockton Road, Chorlton-cum-Hardy, near Manchester.
 1887. Hargreaves, J. A., 3, Ramshill Road, Scarborough, Yorks.
 1897. Harrison, Miss G. M., 14, Queen's Road, Southport, Lancs.
 1889. Hartley, Alfred, 19, Thorpe Garth, Idle, near Bradford, Yorks.
 1904. Harrison, Russell C., 7, Foulser Road, Upper Tooting, London, S.W.
 1887. Harvard, T. Mawson, 23, Northbrook Road, Lee, London, S.E.
 1903. Hawkins, John, J.P., 35, Avenue Road, Grantham.
 1887. Heathcote, Wm. Henry, F.L.S., 119a, Fishergate, Preston, Lancs.
 1896. Herdman, Prof. W. A., D.Sc., F.R.S., The University, Liverpool.
 1887. Hey, Thomas, 8, Bloomfield Street, Derby.
 1895. Hibbert, Charles R. C., Riccard's Down, Abbotsham, Bideford, Devon.
 1895. *P* Hickson, Prof. Sydney J., D.Sc., M.A., F.R.S., University, Manchester.
 1893. Hill, John, Little Eaton, near Derby.
 1886. *L* Hillman, Thomas Stanton, Eastgate Street, Lewes, Sussex.
 1886. Holmes, W. J. O., F.L.S., Strumpshaw Hall, Norwich.
 1891. Horsley, Rev. Canon J. W., St. Peter's Rectory, Walworth, London, S.E.
 1884. Howell, George O., 210, Eglinton Road, Plumstead, Kent.

1892. Howorth, Sir Henry Hoyle, K.C.I.E., M.P., F.R.S., etc., 30, Collingham Gardens, London, S.W.
1886. *P* Hoyle, W. E., M.A., D.Sc., Director of the Manchester Museum, University, Manchester.
1895. Hudson, Rev. Hy. A., 445, Stretford Road, Manchester.
1901. Jackson, J. Wilfrid, 18, Bedford Avenue, Manley Park, Manchester.
1886. James, John H., A.R.I.Cornwall, 3, Truro Veau Terrace, Truro.
1891. Jenner, James Herbert Augustus, F.E.S., 209, School Hill, Lewes, Sussex.
1904. Jennings, F. B., 152, Silver Street, Upper Edmonton, London, N.
1894. Jones, Kenneth Hurlstone, M.B., F.L.S., R.N. Barracks, Chatham, Kent.
1901. Jukes-Browne, A. J., F.G.S., Floriston, Cleveland Road, Torquay.
1897. *L* Kennard, A. S., Benenden, Mackenzie Road, Beckenham, Kent.
1902. Kensett, Percy F., Broadmeadow, Coombe Lane, Wimbledon, London, S.W.
1897. Kenyon, Mrs. Agnes Fleming, 291, Highett St., Richmond, Melbourne, Victoria.
1887. Kew, H. Wallis, F.Z.S., 9, Queen's Road, Bromley, Kent.
1889. Knight, Rev. G. A. Frank, M.A., F.R.S.E., St. Leonard's Bank, Perth.
1901. Laidlaw, F. F., B.A., University, Manchester.
1899. Lancaster, Ernest Le Cronier, B.A., M.B., Winchester House, Swansea, S. Wales.
1879. Laver, Henry, M.R.C.S., F.L.S., Head Street, Colchester, Essex.
1894. Lawson, Peter, 11, The Broadway, Walham Green, London, S.W.
1900. Lebour, Miss M. V., Radcliffe House, Corbridge-on-Tyne, Northumberland.
1878. Leicester, Alfred, Scottdale, New Ferry, Cheshire.
1899. Lightfoot, Robert M., South African Museum, Cape Town.
1903. Linter, Miss J. E., Saville House, Twickenham.
1896. Linton, John, 25, Wordsworth Road, Smallheath, Birmingham.
1897. *L* Lodder, Miss Mary, Bank of Australasia, Launceston, Tasmania.
1895. Loydell, A., 36, Milton Road, Acton, London, W.
1898. Lucas, B. R., 3, Dyar Terrace, Winnington, Northwich, Cheshire.
1891. Lyons, Lady, Kilvrough, Parkmill, R.S.O., Glamorganshire, S. Wales.
1889. MacAndrew, James J., F.L.S., etc., Lukesland, Ivy Bridge, Devonshire.
1903. McClelland, Hugh, Bryn, Somerville Road, Sutton Coldfield.
1885. McKean, Kenneth, Lloyds, London, E.C.
1886. McMurtrie, Rev. John, M.A., D.D., 13, Inverleith Place, Edinburgh.
1884. Madison, James, Turves Green, West Heath Rd., Northfield, Worcestershire.
1885. Marquand, Ernest D., A.L.S., 14, Saumarez Street, Guernsey.
1887. Marshall, J. T.
1887. *P* Masefield, John R. B., M.A., Rosehill, Cheadle, Staffordshire.
1904. Massy, Miss A. L., 9, St. James's Terrace, Malabide, Dublin.
1897. May, William Lewis, F.R.S. Tasm., Forest Hill, Sandford, Tasmania.
1889. Mayfield, Arthur, Mendlesham, Stowmarket, Suffolk.
1880. *P* Melvill, James Cosmo, M.A., F.L.S., Meole Brace Hall, Shrewsbury.
1891. Middleton, Robert, Gledhow, near Leeds.
1888. Milne, J. Grafton, Holly House, Plaistow, London, E.
1904. Milne, James N., Foylemore, St. Jude's Avenue, Belfast.
1879. Milnes, Rev. Herbert, M.A., Darley House, Berkeley St., Cheltenham.
1891. Mitchell, James, 240, Darnley Street, Pollokshields, Glasgow.
1902. Moore, Chas. H., 5, Mill Street, Stocks Lane, Stalybridge.
1891. Moss, William, F.C.A., 13, Milton Place, Ashton-under-Lyne.

1903. Nash, P. B., 135, Melfort Road, Thornton Heath, Surrey.
 1899. Neild, J. E., Gilda Brook Road, Eccles, near Manchester.
 1887. Newstead, A. H. L., B.A., 38, Green Street, Bethnal Green, London, E.
 1891. Newton, Richard Bullen, F.G.S., 7, Melrose Gardens, West Kensington Park, London, W.
 1891.*P* Norman, Rev. Canon Alfred Merle D.C.L., F.R.S., etc., The Red House, Berkhamstead.
 1903. Northey, Rev. A. E., M.A., Lisworney, Torquay.
 1901. Norton, Miss E. M., 20, Eastfield Road, Westbury-on-Trym, near Bristol.
 1901. Oelrichs, W., 22, Hackins Hey, Liverpool.
 1887. Oldham, Charles, Brook Cottage, Knutsford, Cheshire.
 1899. Orr, Hugh Lamont, 29, Garfield Street, Belfast.
 1896. Overton, Harry, Ingleside, Innisfallen, Highbridge Road, Wylde Green.
 1903. Pace, S., Marine Biological Laboratory, Plymouth.
 1900. Pannell, Chas., 13, East Street, Haslemere, Surrey.
 1882.*P* Parke, George H., F.L.S., etc., St. John's, Wakefield, Yorks.
 1904. Parritt, H. W., 8, Whitehall Park, Upper Holloway, London, N.
 1887. Parry, Lieut.-Col. G. S., 18, Hyde Gardens, Eastbourne, Sussex.
 1898. Partridge, F. J., 75, High Street, Barnstaple, N. Devon.
 1902. Pattison, Ernest, 52, Regent Road, Leicester.
 1886. Pearce, Rev. S. Spencer, M.A., Long Combe Vicarage, near Woodstock Oxfordshire.
 1901. Penrose, G., Royal Institution of Cornwall, Truro.
 1896. Percival, A. Blayney, Somerset Court, Brent Knoll, Somerset.
 1904. Platt, Thos. H., 73, Clarendon Road, Manley Park, Manchester.
 1886. Ponsonby, John H., F.Z.S., 15, Chesham Place, London, S.W.
 1898. Poore, Arthur S., Heather View, West Heath Road, Bostall Heath, Abbey Wood, Kent.
 1895. Powell, Mrs. A., Nant-y-Velin, Criccieth, N. Wales.
 1903. Preston, Henry, F.G.S., Hawthornden Villa, Spittlegate, Grantham.
 1897. Preston, Hugh Berthon, F.Z.S., 3, Sydney Terrace, Fulham Road, London, S.W.
 1896. Ragdale, John Rowland, The Beeches, Whitefield, near Manchester.
 1899. Ramanan, Vedaraniyam Venkata, M.A., F.Z.S., Kollur, Kistna District, S. India.
 1904. Redding, J. R., 17, Victoria Villas, Clontarf, Dublin.
 1896. Rhodes, John, F.E.S., 360, Blackburn Road, Accrington, Lancs.
 1900. Richards, C. P., Mission House, Stenalees, St. Austell, Cornwall.
 1898. Roberts, A. William Rymer, The Common, Windermere.
 O *P* Roebuck, Wm. Denison, F.L.S., 259, Hyde Park Road, Leeds.
 1901. Rooth, J. A., M.R.C.S., 14, St. George's Place, Brighton.
 1893. Roseburgh, John, Market Square, Galashiels, Roxburgh.
 1892. Rosevear, John Burman, 109, New King's Rd., Fulham, London, S.W.
 1877.*P* Scharff, Robert F., Ph.D., M.R.I.A., Tudor House, Dundrum, Dublin.
 1895.*Z* Schill, C. H., The Elms, Byrom Lane, Macclesfield.
 1904. Scott, Miss Gwynedd, 4, The Terrace, Riding Mill-on-Tyne.
 1886. Scott, Thomas, F.L.S., 3, Menzies Road, Torry, Aberdeen.
 1893. Shackleford, Rev. Lewis John, 24, Chatburn Road, Clitheroe, Lancs.
 1904. Shaw, Rev. W. A., Hazelbeech Rectory, Northampton.
 1904. Sherrin, W. R., 38, Fielding Road, Chiswick, London, W.

1895. Sich, Alfred, F.E.S., Brentwood, 65, Barrowgate Rd., Chiswick, London, W
 1896. Sidebotham, Dr. E. J., Erlesdene, Bowdon, Cheshire.
 1884. Skilton, Mrs. Mary, 21, London Road, Brentford, Middlesex.
 1902. Smallman, Raleigh S., Wressel Lodge, Wimbeldon Common, near London.
 1903. Smallwood, Henry W., Holly Mount, Church Road, Moseley, Birmingham.
 1903. Smallwood, Jas. Clarence, Holly Mount, Church Rd., Moseley, Birmingham.
 1886. Smart, Rev. R. W. J., M.A., Parkham Rectory, Bideford, N. Devon.
 1886. *P* Smith, Edgar A., I.S.O., F.Z.S., Natural History Museum, Cromwell Road, London, S.W.
 1892. Smith, Mrs. Louisa J., Monmouth House, Monmouth St., Topsham, Exeter.
 1899. *L* Smith, Mrs. Lucy A., Cricklade Street, Cirencester.
 1894. Smith, Wm. Chas., 7, Vanston Place, Walham Green, London, S.W.
 1896. Smith, Wm. Rayson, Harleston, Norfolk.
 1900. Solly, E. H., 3, South Street, Deal, Kent.
 1886. *L P* Somerville, Alex., B.Sc., F.L.S., 4, Bute Mansions, Hillhead, Glasgow.
 1887. Somerville, Rev. James E., M.A., B.D., Castellar, Crieff, N.B.
 1902. Sorby, Henry Clifton, LL.D., F.R.S., Broomfield, Sheffield.
 1886. Sowerby, Geo. Brettingham, F.L.S., 15, Station Parade, Kew Gardens, near London.
 1892. Span, Bartlet, Woodlands, Tenby, South Wales.
 1900. Stacey, John, 22, Nithdale Road, Plumstead, Kent.
 1886. Standen, Robert, 113, Sewerby Street, Alexandra Park, Manchester.
 1888. Stanley, Frederick, Rokeby, Edgar Road, Margate, Kent.
 1903. Stelfox, A. W., Oakleigh, Ormeau Road, Belfast.
 1896. Stonestreet, Rev. W. T., Arnside, Prestwich Park, Manchester.
 1904. Stone, R. E. T., Asliffe, 78, Woodstock Road, Oxford.
 1885. *L* Storey, J. A., B.A., Mafeking Villa, Locking Road, Weston-super-Mare.
 1897. Stracey, Bernard, M.B., Sutton Bonnington, Loughborough.
 1890. Stubbs, Arthur Goodwin, The Meads Cottage, Hailey Lane, Hertford.
 1893. Stump, Edward Consterdine, 16, Herbert St., Moss Side, Manchester.
 1899. Sturt, W. Neville, India Office, Westminster, London, S.W.
 1895. Swanton, E. W., The Educational Museum, Haslemere, Surrey.
 1888. *P* Sykes, Ernest Ruthven, B.A., F.L.S., etc., 3, Gray's Inn Place, Gray's Inn, London, W.C.

 1895. Taylor, Frederick, 32, Landseer Street, Park Road, Oldham, Lancs.
 1897. Taylor, Rev. George W., F.R.S. Canada, etc., St. Matthew's Rectory, Wellington, British Columbia.
 1904. *L* Taylor, Gerald Medland, Rossall School, Fleetwood.
 O P Taylor, John W., F.L.S., North Grange, Horsforth, Leeds.
 1901. Taylor, Thos., Tainui Street, Greymouth, New Zealand.
 1903. Thaunum, D., 5, Church Street, Hilo, Hawaiian Islands.
 1886. Tomlin, J. R. le Brockton, M.A., Estyn, Chester.
 1898. Turner, E. Hartley, A.C.A., 33, Bairstow Street, Preston, Lancs.

 1899. Vaughan, J. Williams, J.P., The Skreen, Erwood, R.S.O., Radnorshire, S. Wales; winter address: St. David's, London Road, Guildford.
 1897. Vignal, Louis, 28, Avenue Duquesne, Paris.
 1902. Vincent, C. W., 39, West Bank, Stamford Hill, London, N.

 1902. Wadsworth, J. T., 15, Deramore Street, Moss Side, Manchester.
 1898. Wakefield, H. Rowland, 7, Montpelier Terrace, Swansea, S. Wales.
 1891. Walker, Bryant, 18, Moffat Building, Detroit, Michigan, U.S.A.

1900. *L. Watson*, Hugh, Bracondale, The Avenue, Cambridge.
 1886. *P. Watson*, Rev. R. Boog, LL.D., F.L.S., etc., 11, Strathearn Pl., Edinburgh.
 1900. Webb, Walter, F., 416, Grand Avenue, Rochester, N.Y., U.S.A.
 1895. Webb, Wilfred Mark, F.L.S., Odstock, Hanwell, London, W.
 1902. Weeks, Wm. H., jr., 508, Willoughby Avenue, Brooklyn, U.S.A.
 1895. Welch, Robert John, 49, Lonsdale Street, Belfast.
 1897. West, H. J., 167, Goodrich Road, East Dulwich, London, S.E.
 1886. Whitwell, Wm., F.L.S., Underhill, Kidderminster Road, Hagley, near Stourbridge.
 1901. Wilde, J. W., 17, Hendon Road, Sparkbrook, Birmingham.
 1889. Williams, John M., 31, Grove Park, Liverpool.
 1891. Williamson, Rev. Charles Arthur, M.A., 14, Upper Mount Street, Dublin.
 1890. Wood, Albert, Midland Lodge, Sutton Coldfield, Warwickshire.
 1901. *L. Woodruffe-Peacock*, Rev. E. A., F.L.S., etc., Cadney, Brigg, Lincs.
 1898. Woods, Henry, M.A., F.G.S., St. John's College, Cambridge.
 1886. *L. Woodward*, Bernard B., F.L.S., etc., 4, Longfield Rd., Ealing, London, W.
 1903. Worsdale, R., 75, Dudley Road, Grantham.
 1895. Wright, Charles East, Woodside, Rockingham Road, Kettering.

***Testacella haliotide* var. *flavescens* Moq.-Tand.**—I received a consignment of eleven *Testacella haliotide* Drap. from Mr. Chester G. Doughty, of Martlesham Rectory, near Woodbridge, Suffolk, last Sept. 23rd. They were of the normal size and colouring, excepting one individual which was not only somewhat larger, but also of a uniform bright canary colour. The pigment was rather fainter on the foot of the mollusc, but above the pure yellow colouring made the shell with its brown epidermis a very conspicuous object. In the normal forms the shell is by no means conspicuous. This striking variety of *T. haliotide* is no doubt the variety *flavescens* of Moquin-Tandon ("Hist. Moll. France," 1855, p. 39) and is referred to in the "Monograph of the L. and F. Mollusca of the British Isles," part 8, p. 9, as not yet having been recorded in this country. Mr. Doughty took the slugs in the night-time, crawling on the gravel paths of the rectory garden, Martlesham, near Woodbridge, Suffolk.—Rev. S. SPENCER PEARCE (*Read before the Society*, November 9th, 1904).

Report on the Northwich Ramble, 10th Sept., 1904.—Though Northwich in itself is far from a conchologist's paradise, the neighbourhood affords a few interesting species, and well deserves a visit, but the short time at our disposal and the distance to travel to get to good ground left little time for collecting. The route followed was the Warrington Road, then past the Island Works, across the Ferry, to the Upland Reservoir; en route, the ever encroaching *Paludestrina jenkinsi* was found in company with *Valvata cristata*. A few *Ancylus fluviatilis* were got out of the Upland Reservoir; other shells were very scarce, a feathered conchological party having established itself on the reservoir from the neighbouring farm. Marbury Mill was next reached, and the members gathered a few *Jamnia anglica* and *J. cylindracea* from the small colony there. The next object was to collect *Unio tumidus*, and the nautical talents of the party were shown to great advantage in navigating an ancient boat across Budworth Mere. The Unios were plentiful, but nearly all dead, and the Anodons were in rather better condition. Other shells were gathered, but are included in the list for the district, and need no further mention.—B. R. LUCAS (*Read before the Society*, October 12th, 1904).

THE ORIGIN OF THE LAND & FRESHWATER MOLLUSCA AT PRESENT LIVING IN THE BRITISH ISLES.

(Presidential Address delivered at the Annual Meeting, October 1st, 1904).

By R. F. SCHARFF, PH.D., M.R.I.A.

WHEN collecting land and freshwater shells you have no doubt attempted to satisfy your curiosity as to the reason why some species should be extremely restricted in range, whilst others may be found distributed all over the country. The solution of this problem is not easy, and in many cases we are as yet far from being able to point to a satisfactory cause of such dissimilarity in range. In order to ascertain the cause which produced these conditions, it is desirable, in the first instance, to make a detailed study of the history of the species and of the means of their dispersal.

As regards the various modes by which the land and freshwater mollusca have become dispersed over the British Islands, the most natural and at the same time the usual one is either by slow progression on land for the terrestrial species, or by water for the aquatic forms. But we are especially indebted to Mr. H. W. Kew¹ for his carefully collected statistics as to other means of dispersal possessed by land and freshwater mollusca. From the facts examined by him, he thinks that "it may be safely concluded that the local distribution of the smaller bivalves has been influenced in a marked degree by aquatic insects" (p. 69); though in speaking of land-shells he acknowledges (p. 119) "that we have little or no actual evidence of precise modes of dispersal, even for short distances on land."

The belief that terrestrial mollusca are able to cross the ocean by occasional means of dispersal, is largely based on Dr. Wallace's assumption that all animals now inhabiting truly "oceanic islands" must have reached them either by crossing the ocean or that they must be the descendants of ancestors which did so. More recent researches, however, into the fauna and flora of several so-called "oceanic islands" tend to shew that these were really parts of larger land-masses, and that we are not justified in the supposition that the animals and plants inhabiting them were obliged to cross the ocean to reach them. The evidence, therefore, on which Dr. Wallace relied to prove his theory is not so convincing as he thought.

Some naturalists have spent much thought and labour in speculating on the possible modes of accidental or occasional dispersal, in order to explain the presence of land mollusca on what they consider true "oceanic islands." Yet drift-timber, as Mr. Kew acknowledges, has never been known to carry molluscs or their eggs (p. 138), and I

¹ KEW, H. W., "The Dispersal of Shells," London, 1903.

know of no authenticated record of a living terrestrial mollusk having been carried across the sea to an island and established itself there by any means except by man. We must also remember that unsuccessful attempts at colonization by man, often in most suitable localities, clearly indicate to us how very small must be the chance of the ultimate establishment of a new colony on an island as the result of the transportal of a few individuals by accidental means under the forces of nature.

On the other hand, we do possess positive proof that terrestrial species, particularly suited to withstand the deleterious action of seawater, have been stranded on islands probably for many centuries, and yet have not become established there. I need only refer to *Cyclostoma elegans*,¹ which has been picked up on the Irish coast, and specimens of which must be constantly washed up on the shore owing to the facility with which it floats on the surface. It has not, however, succeeded in securing a permanent abode in Ireland.

Though I do not believe that the molluscan fauna of the British Isles owes its presence there, in any appreciable degree, to occasional means of introduction from the continent by birds, drift-timber, or hurricanes, local distribution is no doubt somewhat influenced by these causes. I fully agree, however, with Mr. Kew in his opinion "that both snails and slugs, during the last three centuries at least, have been more dispersed by human agency than by all other causes together" (p. 178). Nevertheless, among the species of land and freshwater mollusca inhabiting the British Islands, there are only few which can be reasonably regarded as human importations. Mr. Adams,² for instance, in his excellent little manual, expresses the opinion that four terrestrial species were thus introduced into our fauna, viz., *Helix villosa*, *H. terrestris*, *Stenogyra goodalli*, and *Clausilia parvula*. Similarly *Helix pomatia*, *H. aspersa*, *H. cantiana*, and the freshwater species *Physa acuta*, *Planorbis dilatatus*, *Dreissensia polymorpha*, and *Sphærium pallidum* are looked upon by some authorities as recent introductions. Now these, after all, are only about a dozen out of nearly one hundred and forty species known to inhabit the British Isles, so that there seems to be no reasonable doubt that the remaining one hundred and twenty-eight species are mostly indigenous to these islands. If these reached us from the continent they must either have come by land or by accidental dispersal in remote times. It is impossible for us, in the present state of our knowledge, to arrive at a clear estimate of what proportion of these one hundred and twenty-eight species reached our islands by migration

¹ Throughout this address I have adhered to the old nomenclature, as I understood that many members were not sufficiently familiar with the revised one, and had not yet adopted it.

² ADAMS, L. E., "The Collector's Manual of British Land and Freshwater Shells," second edition, Leeds, 1896.

over a former land-connection which may have joined them to the continent, rather than by an accidental or occasional means of distribution. But it is also possible that some species may have originated in the British Islands. We know from Messrs. Kennard and Woodward's¹ researches, that at least twenty-seven species of our present land and freshwater fauna already inhabited these islands in Pliocene times, and one hundred and six during the later Pleistocene period. To judge from the presence in caves of the remains of such large creatures as the Mammoth and the Irish Elk in both England and Ireland, we must conclude that the British Islands were joined to the continent in recent geological times, during which the cave deposits were formed. No necessity, therefore, appears to exist for the assumption that any considerable number of our land and freshwater mollusca colonized these islands by the difficult and hazardous method of crossing the ocean, when they could do so more conveniently by means of a land-passage.

Edward Forbes, who was one of the first naturalists to study the subject of the origin of the British fauna, laid down his views in a very remarkable and fascinating memoir.² In it he expresses the opinion that the British Islands have acquired their fauna and flora by colonization from another neighbouring land, or from several, previous to isolation, and that the greater part of the animals and plants have migrated to our area over continuous land before, during and after the Ice Age (p. 65). The great mass of our pulmoniferous molluscs are believed by Prof. Forbes to have arrived during the Post-Pliocene period, *i.e.*, in Pleistocene times from the Germanic regions of the continent (p. 9). But these species, he says, are deficient westward—in Ireland, for instance, the migration of those less speedy of diffusion, which are now peculiar to England, having been arrested by the breaking-up of that land passage which connected England with Ireland. A little earlier in the history of the British Islands there occurred, according to Prof. Forbes, an incursion of northern animals and plants, transported to our area by floating ice from the north, and stranded on mountains which appeared as islands.

More ancient still is his Kentish fauna, which includes such species as *Helix pomatia*, *H. obvolvata*, *H. cartusiana*, *Clausilia ventricosa*, and *Buliminus montanus*. The Devon fauna is another and yet older fauna and more southern in character. Prof. Forbes remarks that it is well seen in the south-east of Ireland, *Helix pisana* being a mol-luscan representative.

1 KENNARD, A. S., and WOODWARD, B. B., "The Post-Pliocene Non-Marine Mollusca of the South of England," *Proc. Geologists' Association*, vol. 17, 1901.

2 FORBES, E., "On the connection between the Distribution of the existing Fauna and Flora of the British Isles and the Geological Changes which have effected their Area, especially during the Epoch of the Northern Drift," *Memoir Geol. Survey*, vol. 1, 1846.

The south-west of Ireland was considered by Forbes to be the district in which the most ancient British living organisms are found. This view is based entirely on the occurrence of certain plants, as no terrestrial animals peculiar to the district were then known to the learned author; of course we now know that the remarkable slug *Geomalacus maculosus* inhabits that very region.

The hypothesis which he offered to account for this interesting flora is that the plants migrated northward in Miocene times from Spain over a land connection which united it with Ireland, and that the great mass of this southern flora was exterminated in Ireland during the Ice Age, the remaining few being the sole relics of this most ancient of our island flora.

Great advances have been made in our knowledge of the fauna inhabiting the British Islands since Forbes' days, so that we now have better means to revise the deductions formulated by this distinguished naturalist, from a study of the distribution of our native animals. Before doing so, however, it may be of interest to compare the views of more recent observers on the origin of our land and freshwater mollusca with those advanced by Prof. Forbes. Dr. Wallace¹ while merely repeating Forbes' explanation of the poverty in species of Great Britain, as compared with the continent, and of Ireland as compared with Great Britain, gives us nothing new. In fact he does not even allude to Forbes' recognition of the complex origin of the British fauna, and seems to have given the subject little independent thought. He merely states that the submergence in glacial times destroyed the fauna in the British Isles, and that when England became continental the existing animals entered the country (p. 338). But he thinks sufficient time did not elapse before subsidence again occurred, cutting off the further influx of purely terrestrial animals, and leaving us without the number of species which our favourable climate and varied surface entitle us to. Dr. Wallace then proceeds to give us a long list of species and varieties peculiar to the British Islands, but does not inform us whether they have originated there since the Glacial period, or in what manner their present distribution has been brought about.

Dr. Kobelt² regards the fauna of Ireland as an impoverished branch of the English fauna. He does not believe in the pre-glacial origin of such southern species as *Helix acuta*, *H. pisana*, *H. revelata*, and *Pupa anglica*, or of *Geomalacus* and *Testacella*, as he presumes none of them have ever been found in pre-glacial deposits. A later immigration or even an artificial introduction appear to him more probable (p. 220).

¹ WALLACE, A. R., "Island Life," second edition, London, 1892.

² KOBELT, W., "Studien zur Zoogeographie: die Mollusken d. Paläarkt. Region," Wiesbaden, 1897.

The views of Forbes, Wallace, and others, in so far as these authors derive the molluscan fauna of the British Isles from the continent, when the latter was connected with our islands, have been adopted by Mr. John W. Taylor,¹ but in many other respects he abandons the precepts of former writers and strikes out an entirely independent line of thought. He looks upon the north central European region as the birthplace of the chief types of life at present occupying the terrestrial portion of the globe, where he maintains that the highest forms of life are found. From this region the most adaptable and dominating forms are supposed to emerge and to radiate outward. Mr. Taylor divides the British Isles, from a molluscan point of view, into a western or Celtic and an eastern or Teutonic province (p. 402).

Messrs. Kennard and Woodward² express themselves very differently from Mr. Taylor. They urge that our non-marine mollusca have reached this country from various sources. "A large number," they say, "are boreal, some travelled hither along the now sunken land to the north of Scotland, whilst others may have journeyed hither through Siberia and the continent; some have come from the south by the old land connection between England and the continent; others, the so-called Lusitanian forms, have reached us from south-west Europe; a few species may be endemic" (p. 254). That I am in perfect agreement with these views, rather than Mr. Taylor's, may be gathered from a perusal of my work on the "European Fauna."³ I may acknowledge, however, that I fail to fully grasp Mr. Taylor's reasoning on which he bases his arguments that our molluscan fauna has originated in North Central Europe—the modern Germany. He hints (p. 387) that during former arrangements of land and water this active centre of evolution may have been elsewhere, yet on his map he represents even the mollusca of Australia as having travelled to their present abode over a formidable series of land-bridges from Central Europe.

The only safe criterion on which we can base our views as to the place of origin of our species seems to me the consideration of their past and present distribution. When we examine the present range of our one hundred and twenty-seven species, we find among them a number with a general distribution over the British Islands, such as *Helix nemoralis*, *Hyalinia cellaria*, and *Limnæa peregra*, and others with a local distribution such as *Geomalacus maculosus*, *Helix obvolvata*, and *Dreissensia polymorpha*. Lists of British Land and Freshwater Mollusca, such as those which have been drawn up by Messrs. Taylor,

1 TAYLOR, J. W., "A Monograph of the Land and Freshwater Mollusca of the British Isles," vol. 1, Leeds, 1894-1900.

2 KENNARD, A. S. and WOODWARD, B. B., "The Post-Pliocene Non-Marine Mollusca of the South of England," *Proc. Geologists' Association*, vol. 17, 1901.

3 SCHARFF, R. F., "The History of the European Fauna," London, 1899.

Roebuck, and Adams, and are being continued by others, enable us to determine the exact range in the British Islands of every species now living there. On the other hand, Messrs. Kennard and Woodward have devoted a good deal of attention to the study of the past range of these species in our islands.

Now, among the three species I mentioned as having a very wide range in our area, *Hyalinia cellaria* has occurred in various Pleistocene deposits, but the other two—*Helix nemoralis* and *Limnæa peregra*—have even been discovered in beds of Pliocene age. As regards their distribution beyond the British and Irish area, *Helix nemoralis* occurs from Southern Spain and Portugal to Scandinavia, and from Central Italy to Northern Germany, but it is absent from Russia, Eastern Hungary, and Turkey. *Hyalinia cellaria* has a still greater distribution, being found all over Europe and Asia Minor as well as on the Atlantic Islands and in Eastern North America ; while *Limnæa peregra* is likewise found in the whole of Europe and besides in Western Asia and Northern Africa. The range of these three species is *continuous* over the whole area which they inhabit.

The continental range of the three local species, *Geomalacus maculosus*, *Helix obvoluta*, and *Dreissensia polymorpha*, is very different. The first only occurs in Northern Spain and Portugal. *Helix obvoluta* is essentially a Central European species, ranging from Hungary to Denmark, and in the west just crossing the Pyrenees. *Dreissensia polymorpha* is a typically Eastern species, but appears to have spread from there through Russia and Germany as far as England and France. None of these three have occurred in English Pleistocene or Pliocene deposits.

We are not justified in establishing generalisations from so few examples as those quoted, but it seems as if species with a wide range in the British Islands were more ancient and consequently had also a wider continental distribution than those which have a local range in our islands. This hypothesis is probably correct in most cases, but it cannot be relied upon as being always applicable. Among the ancient types of molluscs a certain number no doubt persist, but others would gradually become extinct in certain areas, leaving patches of small colonies in specially favoured localities. We ought to find the remains of such species in Pleistocene and Pliocene deposits, but as everyone knows, our geological strata do not give us a complete picture of the fauna of past ages, and many recent species are almost certainly ancient, of which we possess no fossil remains. In such cases "discontinuous distribution" as shown by *Geomalacus maculosus* undoubtedly indicates that we have to deal with ancient vanishing types. Then, again, we have to take into consideration that certain species among our land and freshwater mollusca are

endowed with much greater power of dispersion into new areas than others. Hardy forms, like *Helix nemoralis*, probably spread very much more rapidly than species like *Helix fusca*, which is confined to damp and shady glens and woods, so that the latter with a rather local range might yet be an ancient species.

To judge from the present and past range of our land and freshwater mollusca, I think we may safely conclude that they have originated in widely-separated areas of our globe, and have found their way to these islands by different routes. How long they have lived in this country it would be difficult to estimate. It is quite possible, however, that some may have come in early Tertiary times, when the distribution of land and water was vastly different from what it is now.

It was not my intention, in the limited time at my disposal, to give you a complete survey of the history of our land and freshwater mollusca. I merely wished to acquaint you with my views as to the manner in which this study should be prosecuted. No one has as yet worked out the problem with the amount of research and investigation that the subject demands. It is certainly a most complex problem, the solution of which will require years of painstaking thought and study. If my address has awakened, in the younger members especially, a desire to take up this enquiry, I can assure them that they will find it most fascinating, and I should feel also that my object of presenting these few notes to you has been amply fulfilled.



Vivipara contecta var. **atro-purpurea** nov. at Wicken Fen, Cambs.—Whilst collecting shells at Wicken Fen, Cambridgeshire, in August, 1889, and August, 1900, I found a few *Vivipara contecta*, about one-half of which were bandless and of a uniform dark-purple colour, and during August of the present year in the pit-holes on the "Poor Man's Land," Wicken Fen, I again found the same form along with the type. The nepionic whorls in these bandless specimens are bright translucent white, striated faintly, and contrasting strongly with the dark colour of the rest of the shell. As this dark-purple form does not appear to have been previously noticed, I have pleasure in proposing the varietal name *atro-purpurea*, to which variety of *V. vivipara* it corresponds.—FRED. TAYLOR (*Read before the Society*, October 12, 1904).

Limnæa stagnalis var. **umbilicata**.—A specimen of *Limnæa stagnalis* collected by me from a pond at Bell Isle, near Leeds, on the 25th of October, 1904, shows the mouth of the shell differing very much from the type, being more elongated with a slight bulging in of the centre of the outer lip; the shell has also a small umbilicus into which I inserted a bristle to the depth of $\frac{1}{8}$ ths of an inch and in some cases a quarter of an inch. Out of a dozen shells collected, all had the mouth of the shell thus modified, and all the large ones, with the exception of two, the small umbilicus. I have shewn specimens to Mr. Taylor and Mr. Nelson, of Leeds.—W. HARRISON HUTTON (*Read before the Society*, November 9th, 1904).

NOTE ON THE NAME GLYCYMERIS.

By WILLIAM HEALEY DALL, A.M., D.Sc.

(Read before the Society, December 14th, 1904).

MESSRS. Dautzenberg and Dollfus have an interesting discussion on nomenclature in a late number of the current volume of the *Journal de Conchyliologie* (pp. 109-122), in which they advocate going back for "generic" names to the limit of printed books on natural history. As this question is purely academic, the rule having been settled otherwise for more than a century, it would not call for discussion except of an academic kind. But, in the course of the article, the authors announce that the name *Glycymeris* was used by Huddesford in his binominal index to the 1770 edition of Lister's "Historia," thus antedating the use of the same name by Da Costa in 1778. If this statement was correct it would have numerous consequences in the present nomenclature of mollusca. It is, therefore, of some importance that the facts of the case should be stated with precision, so that unnecessary changes shall not be initiated by persons relying upon this statement and unable to consult a somewhat rare book.

Huddesford gives *two* indices in the text which he adds to the impression of Lister's engravings.

The second is entitled "Index alter, conchyliorum classes complectens, juxta methodum celeberrimi Caroli a Linné, et ad Tabulas Listerianas accommodatus," and extends from page 2 (*bis*) to page 77. It contains the Linnean genera in the order in which they occur in the *Systema Naturæ*, and the specific names under each in similar order, not alphabetical, and on the right hand of these names are references to the plate and figure of Lister when the author could identify Lister's figures with any of the Linnean names. In this index the name *Glycymeris* does not anywhere occur.

It may be noted in passing that the word *glycymeris* means a "succulent morsel" and was applied by early writers to such bivalves as were esteemed especially delicious eating.

The first index has the following title:—"Index alphabeticus, conchyliorum classes exhibens eo ipso Ordine in quo disponunter a Listero." If we include a short sub-index of the anatomical plates, it extends from page 1 to 12 inclusive, and contains the names and tabular classifications used by Lister, alphabetically arranged and with references to the number of the copper plate upon which they will be found engraved by the Misses Lister. These frequently refer to ancient works from which some of Lister's figures seem to have been copied, as "*Mytulopectunculus berberoides* Fab. Col." etc., and the nomenclature is that of Lister or the cited authors and *in no case*

Linnean, though frequently expressed in one, two, or three words, on page 4, line 3 from the bottom, we find the words "*Glycemeris Chama Aldrovandi*," with a reference to plate 414. Turning to plate 414 we find it to represent the first species of Lister's group of *Chamæ*, under which it is also indexed on the same page above cited. The engraving is lettered: "Sectio 10, cap. I de Chamæ, ab altero tantum latere ferè naturaliter Hiantibus, Chama Glycimeris Aldrovandè, Mare hispanie mediter."

It seems then, that, so far, from the word *Glycemeris* being used in this instance in the sense of a Linnean genus, it is really used in a specific sense, as a species *Glycemeris* of the group *Chamæ*, to which it had been referred by Aldrovandus. This being the case, the first use of *Glycemeris* for a genus in the Linnean sense becomes that of Da Costa in 1778, as I have elsewhere shown *in extenso*.

New Records for West Lancashire.—One morning, early last month, Mr. J. W. Jackson and I left Silverdale station and struck a footpath across the limestone fells leading to the church. We soon reached a favourite hunting-ground; the little hollow known as Bank Well, where a search was at once made for *Vertigo pygmaea*, obtainable here in fine condition. Working at the base of a low limestone cliff, and almost at the roadside, I was surprised to find in the soil *Cacilioides acicula*, and a combined search soon yielded nearly a score of specimens. Besides occurring in the moss and earth at the base of the cliff, several were found in the earth-filled crevices in the cliff-face. They had evidently been washed down from above, as after heavy rain the water drains through at this point and collects in the tarn just below. Comparison should be made with the Miller's Dale habitat for this shell, *i.e.*, the "over-grown talus at the foot of a series of carb. limestone cliffs" (*J. Conch.*, vol. 10, p. 303, 1903). A further search of the immediate locality was entered on in the hope of getting living specimens, but instead *Helicella itala* was found to be in possession of the grassy slopes, and as a new record, was duly "boxed." Leaving this spot, much elated, we regained the Arnside road. On the top of a mossy wall, covered in parts with ivy (a typical habitat), Mr. Jackson found what we had long been in search of—*Vertigo alpestris*. Only three living examples were taken, with several dead ones, but this scarcity may be attributed to the lateness of the season. It was found in company with *V. pusilla*. *Vertigo alpestris* has been recorded for South Lancashire by Dr. Gilbertson, who found it at Clitheroe (Jeffreys, "*Brit. Conch.*," vol. 1, p. 260), but the most strenuous efforts on the part of later conchologists have failed to corroborate this. A later record is that of Roughlee Valley, Pendle Forest (*J. Conch.*, vol. 9, p. 221, 1899). Reference should also be made to the records for Grange-over-Sands and Cark (*J. Conch.*, vol. 11, p. 44, 46), which districts, although included in Vice-County 69, have perhaps a more direct geological bearing on the above than Clitheroe.—J. DAVY DEAN (*Read before the Society*, December 14, 1904).

NOTES ON A CHARA AND SHELL-MARL DEPOSIT AT HAWES WATER, SILVERDALE, LANCASHIRE.

BY J. DAVY DEAN AND J. WILFRID JACKSON.

(Read before the Society, December 14, 1904).

PLATE III.

For some time past we have been investigating the vast deposit of shell-marl in this neighbourhood with a view to ascertaining the number of species it contains. The Hawes Water under discussion lies to the north of Silverdale station, and must not be confounded with the larger Hawes Water near Shap.

There are two tarns, the largest of which occupies an area of about twelve acres, and is connected with the smaller tarn, called Little Hawes Water—a mere pool compared with the other—by a narrow stream. Both tarns are fed by the various drains from the rising land round about. They are reputed to be of great depth, and viewed from the west side, where the shore shelves out and then appears to drop almost perpendicularly, they certainly look it. We had intended to obtain a boat for the purpose of ascertaining the exact depth by soundings, but were unable to do so.

With the exception of the southern end, the two tarns are shut in by high land, gradually rising from about twenty-five feet above sea level to ninety feet or more, with higher altitudes here and there, such as Challon Hall Allotment, 150 feet, and Trough Plantation, 240 feet. The rock of the surrounding district is mountain limestone. At the south end of this bath-shaped depression it is more or less open, and here a small stream issues from the large tarn, and, passing the sides of Hawes Water and Leighton Mosses, receives their numerous drains on its way to the sea.

The deposit, consisting of a mass of comminuted chara stems with dead shells scattered indiscriminately through it, occupies a great part if not the whole of the basin described above, and it is evident from this that the tarns had formerly a much larger extent than at present and might possibly have been united. The severance of these, and the narrowing of their limits, may have been brought about by the usual process of the gradual filling up of a lake, partly by the washing of detritus down from the adjoining slopes, and partly by the successive generations of chara decaying and falling to the bottom along with the numerous dead shells of the mollusca inhabiting the lake.

The marl is, for the most part, covered by a bed of peat; a good section, however, presents itself at the north end of the large tarn, where no peat rests on it, and where it forms a series of low abrupt cliffs, from three to five feet high, encircling almost the whole of this

end. These cliffs are entirely composed of marl with no other admixture, except perhaps occasional long black stems of plants, resembling *Equiseta*, and at one point a number of angular limestone boulders are included. There is also a thin seam of remains of mosses, about three inches thick, at a depth of four feet from the surface. Thinking we should bottom the deposit, we dug down here for over a foot, but were not successful. A sloping beach extends from the foot of these cliffs, and is strewn with immense numbers of dead shells, bleached quite white, and composed for the most part of *Limnæa pereger* and *Bithynia tentaculata*. The long series of white cliffs and the shell-strewn beach make the shore a conspicuous object when seen from the main road some distance away.

The vast number of shells accumulated here is the result of the water of the tarn being driven up against the small cliffs by prevalent south-west winds, consequently large masses of deposit are undermined and eventually fall down. In course of time these masses are disintegrated by the action of the water, and the shells freed from the matrix. They are then deposited in various degrees of fineness and weight, and occur in long rows fringing the shore, while the vegetable débris washing up from the tarn, mingling with them, gives the place the appearance of a sea beach. In some cases the mass seems entirely made up of *Limnæa pereger*, in others *Bithynia tentaculata* appears to predominate, and in one or two cases the opercula of the last-named species occur to the entire exclusion of anything else, except perhaps shells of *Valvata piscinalis* and *V. cristata*. *Planorbis crista* occurs also, but is generally found under the water's edge.

Although this mechanical sorting is useful in some respects, it does not necessarily follow that the shells thus accumulated are derived from the deposit itself, for mixed with them are many dead shells of terrestrial origin (e.g., *Carychium minimum*, *Cochlicopa lubrica*, *Hygromia hispida*, etc.), together with dead aquatic species washed up from the tarn. To be absolutely sure of the species actually occurring in the deposit, we brought away large pieces of it to wash and sort out at home, with the result that we found the following:—

<i>Bithynia tentaculata</i>	-	Common.
<i>Limnæa pereger</i>	-	Common.
<i>Valvata piscinalis</i>	-	Common.
<i>V. cristata</i>	-	Not common.
<i>Planorbis crista</i>	-	Rare.
<i>Pisidium obtusale</i>	-	Common.
<i>P. pusillum</i>	-	Common.
<i>P. gassiesianum</i>	-	Rare.

All the shells of the *Pisidia* had both valves adherent; the opercula of *Bithynia* also occurred in various stages of growth. There

were two forms of *Linnaea pereger*, both small, one having a long spire and the other a short one. Of *Valvata piscinalis*, the form *antiqua* appeared to predominate, with occasional examples of *depressa*. The shells of *V. cristata* were only small, and could not be compared with the specimens found by Mr. Welch in the shell-marl at Ballyfinragh Lough, Portaferry, Co. Down (*Irish Naturalist*, vol. 11, p. 46, 1902). *Planorbis cristata* occurred very sparingly, only about half-a-dozen specimens were obtained from some pounds of material.

Having looked through a large amount of literature bearing upon the geology of this and adjoining districts, we cannot find that there has been any previous attempt properly to investigate this deposit, which is a matter for some surprise, considering that such a fine section is available. The only exception is its mention by Mr. David Dyson, in his somewhat scarce and little-known work,¹ which runs as follows:—“Haweswater, or Hazewater, is a small lake or tarn situate in the township of Silverdale, in the parish of Warton, in the county of Lancaster. Its extent is about twelve acres, and its depth varies from thirty to forty feet. The water is very clear, and without any admixture of sea-water. The shells thrown up at the north side of the tarn are all dead, without epidermis, but perfect in form, and purely white; and there can be little doubt that living specimens exist in vast numbers at the bottom of the water. The tarn is surrounded on all sides, except the north, by peat-bog, which rests on a layer of shells from two to three feet thick. A vertical ridge of rock forms the northern boundary of the tarn, having a sloping beach formed principally of the *detritus* of the shell (*Bithynia tentaculata*) in question. The rocks of the district consist entirely of mountain limestone, with the usual veins of iron and copper, and with some traces of old red sandstone. There is a smaller tarn very near, called Little Hazewater, very deep, but containing very few shells. The people in the neighbourhood use the shells for strewing on flagged floors, instead of sand; and the deeper layers, which are finely pulverised, are used instead of lime for whitewashing, being a very pure white. A more extensive deposit of the shell (*Bithynia tentaculata*) is to be seen on the Burton and Yealand Mosses, through the centre of which the Milnthorpe turnpike-road passes. The extent of this morass is two or three hundred acres, a great portion of which rests on a thick layer of shells, many of them unbroken, but all without epidermis, and all purely white.”

This, however, is not his own wording, he having borrowed it from the correspondence of a scientific friend of the name of Walling. It would, therefore, be interesting to know who this Mr. Walling was, and if he has written anything on the matter, and we should be glad

1 “The Land and Freshwater Shells of the District around Manchester, 1850.”

if any of our members could help us in this respect, as our own efforts have failed to glean any information concerning him.

The matter having been thus neglected we devoted much of our time and energy to it, and trust that the results so far obtained will be not unworthy of the attention of our fellow-workers.

For the purpose of ready reference, we have arranged the species found in the deposit, along with those now living in the neighbourhood, in a table which will be found at the end of the paper. In this table we have queried several of the shells in the column marked "In deposit," owing to the fact that they were found amongst the débris on the shell-beach and not in the actual deposit. Although having a bleached semi-fossil appearance, we thought it better to do this, in order not to lead to any misconception.

Three of them—*Pisidium pulchellum*, *Sphærium corneum*, and *Planorbis fontanus*—we have not yet found living in the tarn or its immediate neighbourhood, but the last occurs plentifully in Bank Well, not far from Silverdale station.

A similar deposit evidently occurs in Crummockdale, near Clapham, and is referred to by Mr. Hugh Richardson, in his paper on the mollusca of the neighbourhood of Clapham, Yorkshire,¹ wherein he mentions the following species from "lake-marl":—

<i>Sphærium corneum</i> (L.),	<i>Planorbis nitidus</i> (Müll.),
<i>Pisidium</i> ————?	<i>Limnæa peregra</i> (Müll.),
<i>Valvata piscinalis</i> (Müll.),	<i>L. palustris</i> (Müll.).
<i>V. cristata</i> Müll.,	

He also states that there is little or no peat above it.

Mr. R. Welch informs us that he has worked similar deposits in Ireland, and through his kindness we have been able to examine and compare specimens of the marl from such places as Carra, Co. Mayo; and Kilnamadoo, Enniskillen. These, however, are more compact and bear every appearance of having been subjected to more pressure.

As mentioned by Dyson, there is a more extensive deposit on the Burton and Yealand Mosses, but we have not yet investigated it sufficiently to say much about it. We have casually examined a portion known as Hale Moss, where we found several species of land and freshwater shells in a semi-fossil condition. These were on the surface of what appeared to be a dried-up morass, the place appearing quite white as seen from the road. The following are the species obtained:—*Limnæa pereger*, *Bithynia tentaculata*, *Hygromia hispida*, *Hy. rufescens*, and *Succinea elegans*.

The last species possesses a remarkably thick shell, and also occurs living in the small tufts of grass growing on the deposit. Judging from the living shells, they are all referable to the var. *ochracea*, but at first sight they strongly resemble *S. oblonga*.

To investigate thoroughly the exact area of these deposits, it would be necessary to be on the spot more often than was possible for us, in order to examine the various drains which are cut through the peat and deposit periodically. We were fortunate on one occasion in being there when one of these was cut, and observed the junction of the peat and marl. This was very clearly defined, there being no gradual passage of the one into the other, as might be expected.

No doubt much remains to be done as regards ascertaining the number of species in the deposit, its depth, and the probable time taken in forming it; but these are more or less geological matters, and would not, therefore, come within the scope of this *Journal*. Notwithstanding this fact, we hope to pursue our investigations still further, with a view to elucidating one or other of these points.

Regarding the living shells of the district, we are hoping to publish a list in due course, including a general survey of the mollusca of this region, using Morecambe as a base from which anyone conchologically inclined might profitably make excursions.

We will now conclude by tendering our best thanks to those who have helped us to make this paper as complete as possible. More especially are we indebted to Mr. R. Welch for aid in the preparation of the block for illustration; to Mr. C. Oldham for the identification of doubtful *Pisidia*; also to Messrs. R. Standen, A. S. Kennard, and J. Postlethwaite, secretary of the Keswick Literary and Science Society, for their kind advice and assistance.

TABLE SHEWING THE SHELLS FOUND IN THE DEPOSIT, AND THOSE LIVING IN THE DISTRICT AT THE PRESENT TIME.

SPECIES.	IN DEPOSIT.	LIVING.
<i>Limnæa pereger</i> -	Common	Ditch, E. side.
<i>Bithynia tentaculata</i> -	"	" "
<i>Valvata piscinalis</i> -	"	Connecting Ditch.
<i>V. cristata</i> - -	Fairly Com.	Bank Well.
<i>Planorbis crista</i> -	Sparingly	
<i>P. albus</i> - -	?	Connecting Ditch.
<i>P. contortus</i> - -	?	" "
<i>P. fontanus</i> - -	?	Bank Well.
<i>Sphærium corneum</i> -	?	
<i>Pisidium pulchellum</i> -	?	
<i>P. pusillum</i> - -	Common	Pools, E. side, and Connect- ing Ditch.
<i>P. obtusale</i> - -	Common	" "
<i>P. nitidum</i> - -	?	Connecting Ditch.
<i>P. milium</i> - -	Rare	" "
<i>Succinea elegans</i> -	?	N. end.

PROCEEDINGS OF THE CONCHOLOGICAL SOCIETY OF GREAT BRITAIN & IRELAND.

334th (Annual) Meeting, October 1st, 1904.

Held at the Manchester Museum.

Dr. R. F. Scharff, M.R.I.A. (President) in the chair.

Donations to the Cabinet announced and thanks voted :

Specimens of *Limax tenellus* and white examples of *Limax arborum*, from Mr. W. Denison Roebuck, F.L.S.

Donations to the Library announced and thanks voted :

"Some Nudibranchs from East Africa and Zanzibar," parts 3 and 4, by Sir Charles Eliot (*from the author*), and the usual periodicals received in exchange.

Appointment of Auditors.

Messrs. J. Wilfrid Jackson and J. T. Wadsworth were appointed Auditors.

Appointment of Scrutineers.

Messrs. R. Cairns and R. J. Welch were appointed Scrutineers.

New Member Elected.

Sir Charles Eliot, K.C.M.G., Government House, Mombasa, East Africa.

Resignations.

Miss E. P. F. Bury, Mr. J. H. Killingbeck, Mr. G. M. Morris.

Member Deceased.

Mr. J. G. Shillito.

Annual Report and Balance Sheet.

The Annual Report of the Council (see p. 154), and the Treasurer's Report, including the Balance Sheet for 1903 (see p. 61), and the Interim Balance Sheet up to September 22nd, 1904 (see p. 155), and the Recorder's Report (see p. 155), were presented and adopted.

Report of the Leeds Branch.

The Report of the Leeds Branch from 1898-1903 (see p. 156) was presented and read.

Election of Officers and Council.

The Scrutineers reported that sixty-three valid papers had been received, and that fifty-nine voted for the entire list as nominated by the Council. The Officers and Council on the list (see p. 130) were therefore declared to be duly elected.

President's Address.

Dr. R. F. SCHARFF then delivered his Valedictory Address (see p. 138) on "The Origin of the Land & Freshwater Mollusca of the British Isles," on the conclusion of which a cordial vote of thanks was tendered to him on the motion of Mr. Charles Oldham, seconded by Mr. J. R. B. Masefield.

Exhibits.

By Mr. Edward Collier : A nearly complete series of *Obba*, *Chloritis*, and *Planispira*, and a fine series of the smaller British land and freshwater shells, including *Succinea oblonga* and *Vertigo moulinsiana* from Branton Burrows, North Devon, and *Helicella caperata* monst. *sinistrorsum* from sandhills, Woolacombe Bay, North Devon, collected in August last.

By Mr. J. M. Williams : Very choice specimens of *Oliva mediocincta*, *Cypræa argus*, a curious green variety, *C. cruenta*, with rich purple mouth, varieties of *C. caurica*, and *C. pulchella* var. *pericalles* M. and S.

By Dr. K. H. Jones : New species of *Limnaea* and *Pecten* collected at Shantung, China.

By Mr. Bartlet Span : A fine scalariform *Natica catena* from Tenby,

By Mr. J. E. Cooper : *Punctum pygmaeum* from Marden Park, Surrey.

By Mr. Fred. Taylor : *Vivipara contecta*, a bandless, uniform, dark purple variety, equivalent to *V. vivipara* var. *atro-purpurea*, from Wicken Fen, Cambs., a remarkable scalariform *Planorbis corneus*, and a series of British *Vertigines*.

By Mr. J. Wilfrid Jackson : An interesting series of shells obtained by Mr. J. D. Dean and himself from the "Chara Marl" deposit at Hawes Water, near Silverdale, Lancs., with specimens of the deposits and maps and sectional plans ; also a set of the shells now living in the vicinity.

By Mr. Thomas Edwards : A series of Helicidae from U.S. America ; a fine set of sinistral, acuminate, carinate, scalariform and other monstrous forms of *Buccinum undatum* ; *Purpura lapillus*, type and vars. ; *Neptunea antiqua* monst. *contrarium*—all from Thanet coast, Kent.

By Mr. C. E. Wright : Selected varieties of Helicidae and *Limnaea*, from Hants., Kent, Northants, Sussex, Dorset, Leicestershire, Norfolk, and Guernsey, including many beautiful and uncommon forms of *Helix nemoralis* and *H. hortensis*.

By Mr. W. Denison Roebuck : A living example of *Limax tenellus* from Kincardineshire, taken 23rd Sept., 1904, at Invercannie near Banchory, by Mr. George Sim, and sent along with a variety of other slugs to Mr. Roebuck ; also living examples of an almost albino form, with black eye-specks, of the tree slug, *Limax arborum*, taken near the Botanic Garden, at Old Aberdeen.

By Mr. Lionel E. Adams : Specimens of the various bivalves used as food in the United States under the general name of "Clam," as exhibited at the St. Louis Exhibition, and presented to the Manchester Museum by H. F. Moore, Esq., of the Department of Commerce and Labor, Washington.

By Mr. J. T. Wadsworth : *Barnea candida*, preserved with siphons extended, from Meols, Cheshire, and Microscopic sections of the luminous organs of certain Cephalopods—(a) from the mantle of *Abraliopsis* ; (b) from the siphon, and in front of the eye, of *Pyroteuthis margaritifera* ; (c) from the mantle of *Histiopsis atlantica* ; also the epithelial organ of *Polypus arborescens*.

By Mr. R. Drummond : *Teredo megotara* from floating timber, Blackpool.

By Mr. E. D. Bostock : Very large *Ancylus fluviatilis* var. *capuloides*.

By Mr. J. Ray Hardy : A keel-less form of *Helicigona lapicida* from Derbyshire.

By Mr. R. Standen : *Dreissensia polymorpha* from most of its British localities, a fine series, illustrating the extreme variation of the species, and including some "historic" sets, collected many years ago, in localities now obliterated, by some of the older Manchester naturalists.

By Mr. C. H. Moore : *Anodonta cygnea* and *Unio tumidus*, caught whilst spinning for pike in the river Trent, at Lanham, near Nottingham.

By Mr. J. D. Dean : *Limnaea pereger* and *Pisidium pusillum*, from Knott Hollow, Ulverston, alt. 500 ft. ; *Planorbis albus*, *Pl. fontanus*, and *Valvata cristata*, from Bank Well, Silverdale.

By the Manchester Museum : Twelve large drawers of European land shells ; mollusca of Lakes Tanganyika, Nyanza, and Nyassa, and other shells ; the whole being a selection from the extensive collection of mollusca recently presented to the Museum by Mr. R. D. Darbishire ; a set of *Rostellaria delicatula* Nevill, from the Persian Gulf (Townsend Collection), showing growth stages and variation in the denticulation.

The Shell Gallery was also thrown open for the inspection of members, a number of special exhibits being on view in the side cases, including shell-boring mollusca, *Cardium*, and other shells from Lake Baikal, Sea of Aral, etc., illustrating influence of freshwater upon marine forms ; pearl-bearing mollusca, etc.

ANNUAL REPORT.

DURING the past year ten meetings of the Society have been held from October 14th, 1903, to September 14th, 1904. Between the last Annual Meeting and the end of the year five members were elected, three resigned and two died, and there appeared in the list published on the 1st of January 278 names. Since then 17 members have been elected (one of whom, Mr. G. H. Clapp, had previously been a subscriber), 10 members have resigned, three have been removed from the list for non-payment of their subscriptions, and two members have died, so that there are now 279 ordinary members on the list. The four members whose loss by death the Society has to deplore are, Messrs. W. D. Crick, I. C. Thompson, J. G. Shillito and Dr. P. Brookes Mason, an ex-president. One honorary member, Dr. Eduard von Martens, has also passed away, leaving not only the Society but the whole conchological world poorer for his loss.

Without including the number of the *Journal* for October, 1904, which will be published to-day, four instalments have been issued during the year, containing 136 pages, two plates, and several woodcuts.

Amongst other papers was published a new and revised "List of British Non-Marine Mollusca," by Mr. B. B. Woodward. To this a large number of varietal names were added by Messrs. Lionel E. Adams and R. Standen, and thus enlarged it has been issued by the Society as an official publication and a considerable number of copies have been sold.

The Library still continues to increase, the additions being principally in the form of Journals and Transactions received in exchange. The Deutsche Malakozoologische Gesellschaft has supplied the volumes necessary to complete the set of its publications in the Society's Library and welcome donations have been received from Dr. Bellini, Dr. Eduard von Martens, Messrs. G. P. Farren, G. K. Gude, and Chas. Pannell.

Donations to the Society's Cabinet have been received from Miss J. E. Linter and Mr. C. S. Carter.

The Council has to report, with great regret, that Mr. Lionel E. Adams has found it necessary in consequence of his leaving Stafford and of the uncertainty of his subsequent movements to resign the office of Recorder. They requested Mr. Charles Oldham to discharge until the Annual Meeting the duties of the office, which he has effectively performed and they have much satisfaction in nominating him for election as Mr. Adams' successor.

In this connection the Council think it desirable to remind the Society that the distinguishing feature of its records of British Land and Freshwater Mollusca is that no specimens are entered unless they have been seen by the Society's Recorder. This plan ensure the authenticity of the Society's official list. The Recorder will at all times be glad to receive specimens from members for identification, especially from those counties which remain blank in Mr. Adams' recently published "Census" (see vol. 10, pp. 217—231).

During the summer rambles to Miller's Dale, Fleetwood and Northwich have been arranged and been attended by a fair number of members; accounts of these will in due course appear in the *Journal*.

The special exhibits at the monthly meetings have included selected genera representative of all divisions of the mollusca. The bringing together of such a large number of specimens of various species has been of great value to the members present and has given rise to the discussion of a great many interesting questions.

The demand for the Society's publications continues satisfactory; the amount received last year was £26 16s. 2d., for the present year up to date the sum has been upwards of £10.

Having heard that the seventieth birthday of Hermann Strebel was to be celebrated by his friends and colleagues on January 1st, the Council sent an address of congratulation in the name of the Society, signed by the President and Secretary. An account of the proceedings at this celebration, including the text of the address and Dr. Strebel's reply, has already appeared in the *Journal*.

In conclusion the Council feel that they have to record a year of undiminished activity in the prosecution of the objects of the Society and they look forward with confidence to its increased activity in the future.

Treasurer's Statement.

The statement of accounts for the year 1903 will be found published in the April number of this year's *Journal* (p. 61), from which it will be noticed that a balance of £18 8s. 9d. was brought forward. In bringing before the Society the interim statement for the present year, made up to September 22nd, it is gratifying to note that the finances of the Society are now in a very satisfactory condition, there being a balance in hand of some £14, and unpaid subscriptions to the extent of another £15. The outstanding accounts do not at the present time exceed £1, with the exception of the amounts paid for postage of the *Journal*, etc., which will be more than covered by the sale of publications, payment for which has not yet been received.

Statement of Income and Expenditure

for the year 1904 up to September 22nd.

RECEIPTS—	£	s.	d.	EXPENDITURE—	£	s.	d.
Balance forward	18	8	9	Printing—			
Two Life Composition Fees	6	6	0	<i>Journals</i> for Oct., 1903, to			
Subscription s	54	19	0	July, 1904 (4 numbers)	51	5	3
Advertisements	4	0	0	Reprints	5	1	4
				Lists Non-Marine Mollusca			
				(1000 copies)	6	5	0
				Stationery	2	9	6
				Receipt Books	1	2	6
				Bookbinding	0	13	0
				Drawings	1	8	0
				Treasurer's Expenses	1	8	9
				Cash in hand	14	0	5
	<u>£83</u>	<u>13</u>	<u>9</u>		<u>£83</u>	<u>13</u>	<u>9</u>

E. D. BOSTOCK.

Recorder's Report.

Since the publication of the Census in the *Journal of Conchology* (vol. 10, pp. 217-237) 696 new comital records have been registered, the bulk of which, thanks to the valuable assistance of Miss Massy, Messrs. R. Welch, P. H. Grierson and H. L. Orr, have come from Ireland; from Scotland, on the other hand, whence information is particularly desired, hardly any new records have been received.

In England, Mr. F. J. Partridge has done valuable work by contributing thirty-nine new records from North Devon; and in Wales, Mr. J. Williams Vaughan has added thirty-one from Brecon and Radnor. Reference to the Census will show that records of even the common species are wanting for many counties, East Cornwall, North and South Wilts, West Suffolk, Hunts., Carmarthen, Cardigan, and Flint having been almost entirely neglected. The scientific value of an exact knowledge of the distribution of our land and freshwater mollusca is obvious, and it is earnestly

hoped that members who have opportunities for collecting will make an effort to further this end by forwarding specimens to the Recorder for registration. *Helix excentrica*, *H. costata*, *Pisidium henslowianum*, *P. pulchellum* and *P. obtusale* have been accorded specific rank in Mr. B. B. Woodward's list, which has lately been adopted by the Society, and records of the occurrence of these are desired from all districts.

As I have been obliged to relinquish the recordership, members are requested to forward all specimens for registration to my successor, Mr. C. Oldham, Brook Cottage, Knutsford, Cheshire.

LIONEL E. ADAMS.

REPORT OF THE LEEDS BRANCH.

Annual Reports for the periods ending April 15th, 1899; May 12th, 1900; August 24th, 1901; December 13th, 1902; and the 12th December, 1903.

It is the wish of the members of the above club that a short resumé of the several reports should be written for insertion in the *Journal of Conchology*, to bring up-to-date the conditions and researches of the Society.

There have been slight fluctuations in the number of members on the books, caused by death and other reasons. But during the present year the society has practically recovered itself, and the regular attendance and energy shewn by its members prophesy well for its future.

Yorkshire itself has been well surveyed in former times, and has a fair representation of species and varieties of the British Mollusca, therefore it is a difficult matter to extend its series, although this has been done by the addition of one species new to the county (*Physa heterostrophæ*), and one new species to the West Riding (*Paludestrina jenkinsi*), both recorded by Mr. Castle, of Heckmond-wike. New species have also been added to several drainage areas, that were not new to Yorkshire itself. Biological work has also been carried on by Mr. J. W. Taylor, F.L.S., Mr. W. Denison Roebuck, F.L.S., Mr. W. Nelson, and Mr. H. Crowther, F.R.M.S.

Numerous papers have been read on the Physiology, Habits, Geographical distribution, etc., of Mollusca, also the interest of the meetings has been much enhanced by the quantity and variety of exhibits shewn. The club has been officially represented at all the meetings of the Yorkshire Naturalists' Union, and reports have duly appeared in *The Naturalist*, the organ of the union.

The following short extracts will shew the past and present condition of the club:

Annual Report read 15th April, 1899. Mr. H. Crowther held the position of president, with Messrs. W. Denison Roebuck, F.L.S., and Wm. Nelson as joint secretaries. Eight meetings were held during the year with an average attendance of eight members, from a roll of 12 on the books. Several papers were read and exhibits were shewn at all the meetings. The club had to mourn the loss, through death, of a young and extremely capable member, Mr. E. Berry Smith.

Annual Report read 12th May, 1900. Mr. W. Denison Roebuck, F.L.S., president, with Mesdames Brierley and Crowther as joint secretaries. Six meetings were held this year with an average attendance of 8 members, with a roll of 10 and 2 associates on the books. The exhibits were numerous and several papers were given. The club again this year mourned the loss through death of two of its indefatigable working members, Mr. Joseph Whitwham and Mr. W. H. Broadhead.

Annual Report read August 24th, 1901. Mr. H. G. Brierley as president, with Mesdames Brierley and Crowther re-elected as joint secretaries. Six meetings were held with an average attendance of 8 members from a roll of 10. The interest was well kept up by the papers given and exhibits shewn.

Annual report read 13th December, 1902. Mrs. Brierley held the position of president, with Mr. W. Cash as secretary. Seven meetings were held during the period (16 months) with an average attendance of 7. Two members resigned, and one new member was elected. The usual reading of papers and exhibition of specimens were a feature of the year's progress.

Annual report read 12th December, 1903. Mr. Wm. Nelson, president, and Messrs. W. Denison Roebuck, F.L.S., and J. W. Taylor, F.L.S., as joint secretaries. Eleven meetings were held during the year, with the small average of 4 members per meeting, sickness being the cause of the small average. Only two papers were given, but the exhibits were numerous as in other years. The club lost 3 members by resignation, ill-health and other work being the reasons.

FRED BOOTH,
J. E. CROWTHER, } Joint Secs.

335th Meeting, October 12th, 1904.

Mr. Edward Collier (vice-president) in the chair.

Donations to the Library announced and thanks voted :

The usual periodicals received in exchange.

Papers Read.

"Report on the Northwich Ramble," by B. R. Lucas.

"*Vivipara conlecta* var. *atro-purpurea* nov., at Wicken Fen," by Fred Taylor.

Exhibits.

By Mr. T. H. Platt : *Helix nemoralis*, *H. hortensis*, *Helicigona lapicida* var. *nigrescens*, *H. arbustorum*, *Clausilia bidentata*, and *Cæcilioides acicula*, from Miller's Dale, Derbyshire.

By Mr. W. D. Roebuck : *Limax tenellus* (living) taken since the annual meeting (when Scotch examples of this species were shown) at Epping Forest.

By Mr. J. Wilfrid Jackson : A number of interesting examples of the borings of mollusca (*Helix nemoralis* and *H. arbustorum*) underneath ledges of limestone in the Derbyshire Dales, illustrated by photographs taken recently by Mr. R. Welch. A fine specimen of rock with similar holes from Great Orme's Head (collected by Mr. R. D. Darbishire) was also exhibited.

By Mr. R. Standen : A fine example of the boring of *Teredo palmulata* in mahogany, together with a series of the shells and "pallets."

By Mr. F. Taylor : A fine series of *Vivipara conlecta*, to illustrate his note.

336th Meeting, November 9th, 1904.

Mr. Edward Collier (vice-president) in the chair.

Donations to the Library announced and thanks voted :

The usual periodicals received in exchange.

Candidate Proposed for Membership.

J. R. Charnley, F.Z.S., F.E.S., The Avenue, Moor Park, Preston.

Papers Read.

"Notes from the River Weser"; "Notes from Venice"; "*Anodonta cygnea* attached to foot of Plover"; "Do Swans and Ducks eat *Anodonta cygnea*?" by Lionel E. Adams.

"*Helicella caperata* m. *sinistrorsum*," in Northants," by W. A. Shaw.

"Umbilicated *Limnæa stagnalis*," by W. H. Hutton.

"*Vertigo moulinsiana* Dupuy, in Berkshire," by J. R. le B. Tomlin.

"Destruction of Potatoes by Slugs," by E. W. Swanton.

"*Testacella haliotidea* var. *flavescens* Moq.-Tand.," by the Rev. S. Spencer Pearce.

"*Pisidium nitidum* var. *splendens* Moq.-Tand., in West Lancashire," by J. Wilfrid Jackson.

Exhibits.

By Mr. Lionel E. Adams : Examples of land and freshwater shells from Venice and the River Weser, to illustrate his notes.

By Mr. R. Standen : A fine series of *Dreissensia polymorpha*, small clumps of shells of all ages, *in situ*, on shells of living *Anodonta* and small stones projecting from the mud of a reservoir at Butterley, Ambergate, near Derby, collected in October last, by Mr. Thomas Hey. Also specimens of *Limnæa stagnalis* with umbilicus, shewn to illustrate Mr. W. H. Hutton's note.

By Mr. J. Wilfrid Jackson : *Pisidium nitidum* var. *splendens*, *P. obtusale*, and *P. gassiesianum*, from Hawes Water, Silverdale, Lancashire, to illustrate his paper ; *Clausilia laminata*, an elongate form, alt. 20 mm., from Oakwood, Romiley ; also *Cl. bidentata* var. *parvula*, 8 mm. by 2.5 mm., from Ravensdale, Derbyshire.

On behalf of Mr. R. Welch : *Helicella itala*, living, from Rosapenna, Co. Donegal, Ireland, shewing large size combined with rather high spire, as compared with the large flat forms from Dover, Folkestone, etc. ; also living specimens of *Helix nemoralis* and *Helicella barbara* from the same locality. The whole illustrated by photographs of their habitat among the sand dunes.

A fine set of the two British species of *Vivipara* was exhibited by Messrs. Collier, Oldham, Stump, Jackson, Moss, and Standen, from most of the present known and "historic" localities, and an interesting discussion took place.

337th Meeting, December 14th, 1904.

Mr. Edward Collier (vice-president) in the chair.

Donations to the Library announced and thanks voted :
The usual periodicals received in exchange.

New Member Elected.

J. R. Charnley, F.Z.S., The Avenue, Moor Park, Preston.

Candidates Proposed for Membership.

W. Harrison Hutton, 44, Dial Street, Leeds.

W. G. Reynolds, 15, Alfoxton Avenue, West Green, London, N.

Members Deceased.

R. A. Philippi (hon. member) ; C. G. Barrett ; Rev. John Hawell.

Papers Read.

"Notes on a Chara and Shell-Marl Deposit at Hawes Water, Silverdale, Lancashire," by J. Davy Dean and J. Wilfrid Jackson.

"Note on the Name *Glycymeris*," by W. H. Dall.

"Conchological Notes from the United States," by Lionel E. Adams.

"New Records for West Lancashire," by J. Davy Dean.

"*Vallonia excentrica* Sterki in Ireland," by Charles Oldham.

Exhibits.

By Mr. J. Wilfrid Jackson : A series of Semi-Fossil Mollusca from the Hawes-water Chara-Marl Deposits, recent shells from the same vicinity, and a set of photographs, to illustrate Messrs. Dean and Jackson's paper.

By Mr. Lionel E. Adams : A series of land and freshwater shells, from the United States, to illustrate his paper.

By Mr. J. D. Dean : Shells, from West Lancashire, mentioned in his note.

By Mr. Thos. Edwards : Bi-operculate *Buccinum undatum*, and some remarkable carinate examples, with a well-defined slit in the carina, giving the shells a pleurotomoid appearance, from the Isle of Thanet, Kent ; also a magnificent specimen of *Cardium pseudolina* Lam., dredged in deep water off Zanzibar—this is a very striking shell, the specimen shown weighing two pounds, and measuring sixteen inches in circumference.

By Mr. J. W. Baldwin : *Limnea stagnalis*, a fine labiate form, from Pit Lane, near Radcliffe.

By Mr. L. St. G. Byne : *Cypræa physis* in fine condition, dredged alive by fishermen, near Oran, Algeria.

By Mr. C. Oldham : On behalf of Mr. P. H. Grierson, *Helix itala* var. *leucozona*, Carrickmacross, Co. Monaghan, and var. *lentiginosa*, from Trim, Co. Meath ; *H. rotundata* var. *alba* from Lagon Bridge, and *Vallonia excentrica* Sterki.

By Mr. R. Standen : *Phasianella australis*, a large series of the principal colour varieties of this beautiful species ; a fine series of *Rumina decollata* was shewn from many European localities, also from the United States (introduced), and the influence of habitat upon size, and coloration of a species, was strikingly demonstrated by the exhibit.

It was decided to hold the following

Special Exhibits at Future Meetings :

January, 1905	-	Varieties of <i>Helix aspersa</i> .
February, 1905	-	Varieties of <i>Helix nemoralis</i> .
March, 1905	-	Varieties of <i>Helix hortensis</i> .

The above with special reference to the list recently issued by the Society.



Scalariform *Natica catena*.—The accompanying photograph of a curious scalariform monstrosity of *Natica catena* may be of interest to members. I found the shell on the Laugharne (Caermarthenshire) beach, and have seen nothing like it in any collection.—BARTLET SPAN (*Read before the Society*, June 8th, 1904).



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"Beiträge zur Kenntnis der Molluskenfauna der Magalhaen-Provinz," by HERMANN STREBEL (*Zool. Jahrbücher*, Syst., vol. 21, pp. 171-248, 6 pls.).

[An elaborate critical review of the spp. of *Trophon*, of which 24 are recognized, 16 being described as new].

The Journal of Malacology, vol. 11, no. 3, Sept. 1904.

"On some New Species of *Melania* [*M. æruginosa*, *M. dulcis*, *M. fortitudinis*, *M. lauta*], and *Juliennia* [*J. carinata*] from Yunnan and Java," by HUGH FULTON. "On a Collection of Land Shells from Gebi Island, Moluccas, with Descriptions of New Species" [*Papuina fallax*, *Albersia subspherica*, *Leptoperna gebiensis*], by HUGH FULTON. "Note on *Leptopoma crenilabre* Strubell," by HUGH FULTON [Shell figured by Kobelt under this name is probably *L. halmaericum* var.]. "On certain Deposits of Semi-Fossil Shells in Hamakua District, Hawaii, with Descriptions of New Species," by H. W. HENSHAW [*Succinea* 4 nn.spp. figured; list of 46 spp.]. "Report on Semi-Fossil Land Shells found in the Hamakua District, Hawaii," by C. F. ANCEY [*Pseudohyalina meniscus*, *Vitrea hawaiiensis*, *Punctum horneri*, *Endodonta henshawi*, *Tornatellina rudicostata*, *T. cyphostyla*, nn.spp.figd.].

The Nautilus, vol. 18, nos. 6, 7, Oct., Nov., 1904.

"A New Oyster [*O. arrosis*] from the Eocene of Alabama," by T. H. ALDRICH. "New American Lymnaeas, II." [*L. decollata oronensis* Maine; *L. randolphi*, Alaska], by F. C. BAKER. "A Glimpse at the Shell Fauna of Delaware," by S. N. RHOADS [List of 38 spp. with localities]. "A Peculiar *Haliotis*," by F. W. KELSEY [No apertures nor indication of them]. "*Panopea bitruncata* Conrad," by C. W. JOHNSON [Figure and synonymy]. "Notes on Eastern American *Ancylus*, III.," by BRYANT WALKER [10 spp. figd.]. "[Validity of Bolten's Genera]," by W. H. DALL.

Nachrichtsblatt der Deutschen Malakozoologischen Gesellschaft.

"Streifzüge in Süditalien," by W. KOBELT. "Zur Kenntnis der Naiaden von Goyaz," by H. VON IHERING [Notes on 4 spp.]. "Zur Rettung unserer Mollusken Fauna," by S. BRUSINA [Criticism of Bourguignat, list of 16 Croatian *Ennericia*, *Cerithium sykesii* n.sp.]. "Zwei neue *Bulinus* Arten [*B. silvestris*, *B. karagoinensis*] aus Centralasien," by BARON ROSEN.

Journal de Conchyliologie, vol. 52, no. 3, October, 1904.

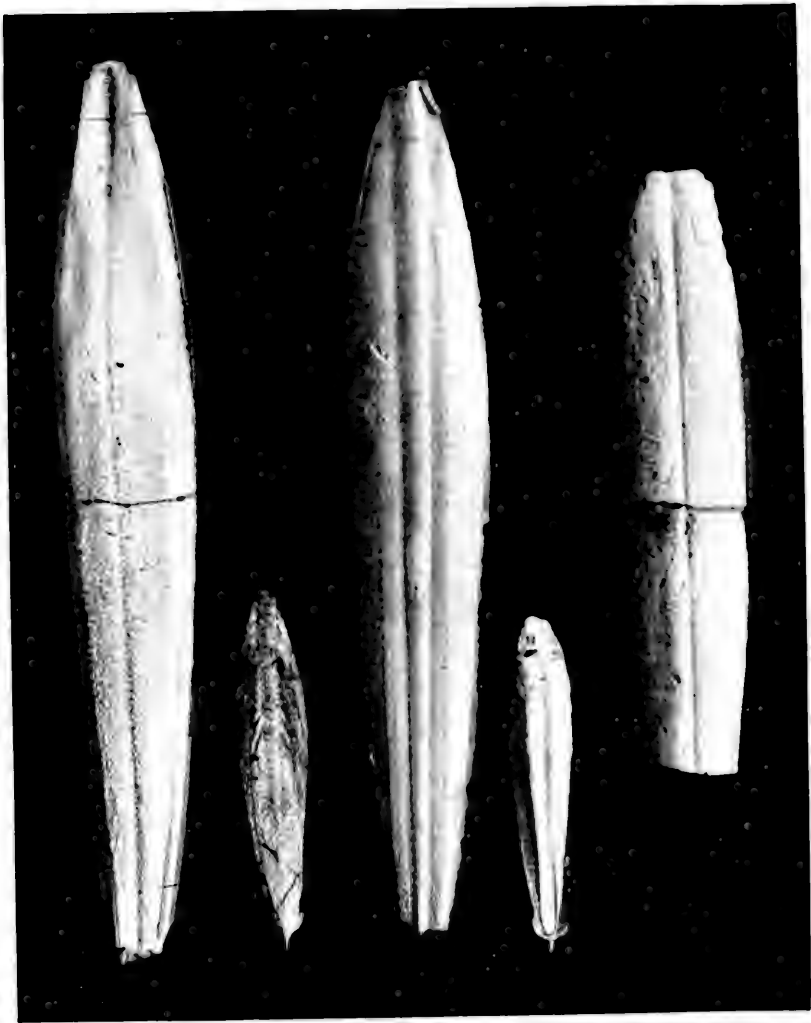
"Descriptions de quelques nouvelles espèces du genre *Pecten* et rectifications," by A. BAVAY [*Chlamys hirasei*, *C. ambiguus*, *C. wilhelminæ*, *C. weberi*, *C. jousseaumei*, *C. cythereus*, nn.spp. figd.]. "Description d'un *Amussium* [*A. sibogæ*] nouveau dragué par le Siboga dans la mer de Celebes," by PH. DAUTZENBERG and A. BAVAY. "Addition à la faune Malacologique du Golfe de Gabès," by PAUL PALLARY [numerous nn.spp. and notes on old ones with figs.].

Transactions of the Academy of Science of St. Louis, vol. 14, nos. 2-5.

"The Molluscan Fauna of the Dells of Wisconsin," by F. C. BAKER [21 spp. with localities]. "Notes on *Planorbis truncatus* Miles," by F. C. BAKER [distinct from *P. trivolvis*]. "Notes on the Pleurotomidæ, with Description of some New Genera and Species," by THOS. L. CASEY [Divided into 8 tribes: *Lophiotoma*, *Tomopleura*, *Glyptotoma*, *Cochlespiropsis*, *Protosurcula*, *Eosurcula*, *Megasurcula*, *Hernisurcula*, *Orthosurcula*, *Tropisurcula*, *Surculoma*, *Microsurcula*, *Lyrosurcula*, *Leptosurcula*, *Eodrillia*, *Ruscula*, *Varicobela*, *Fusitoma*, *Eoclathurella*, *Helenella*, nn.gg.; many nn.spp.].

The Irish Naturalist, vol. 13, no. 12, Dec., 1904.

"*Vertigo angustior* in Co. Carlow," by P. H. GRIERSON.



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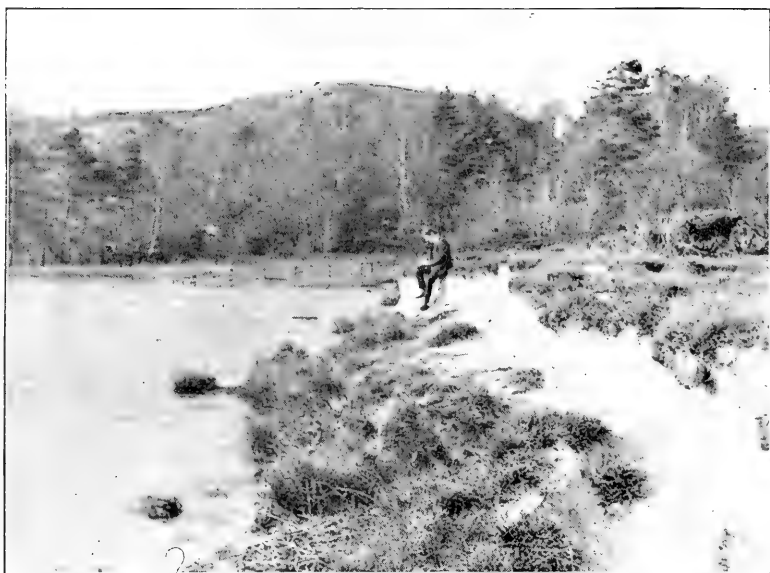
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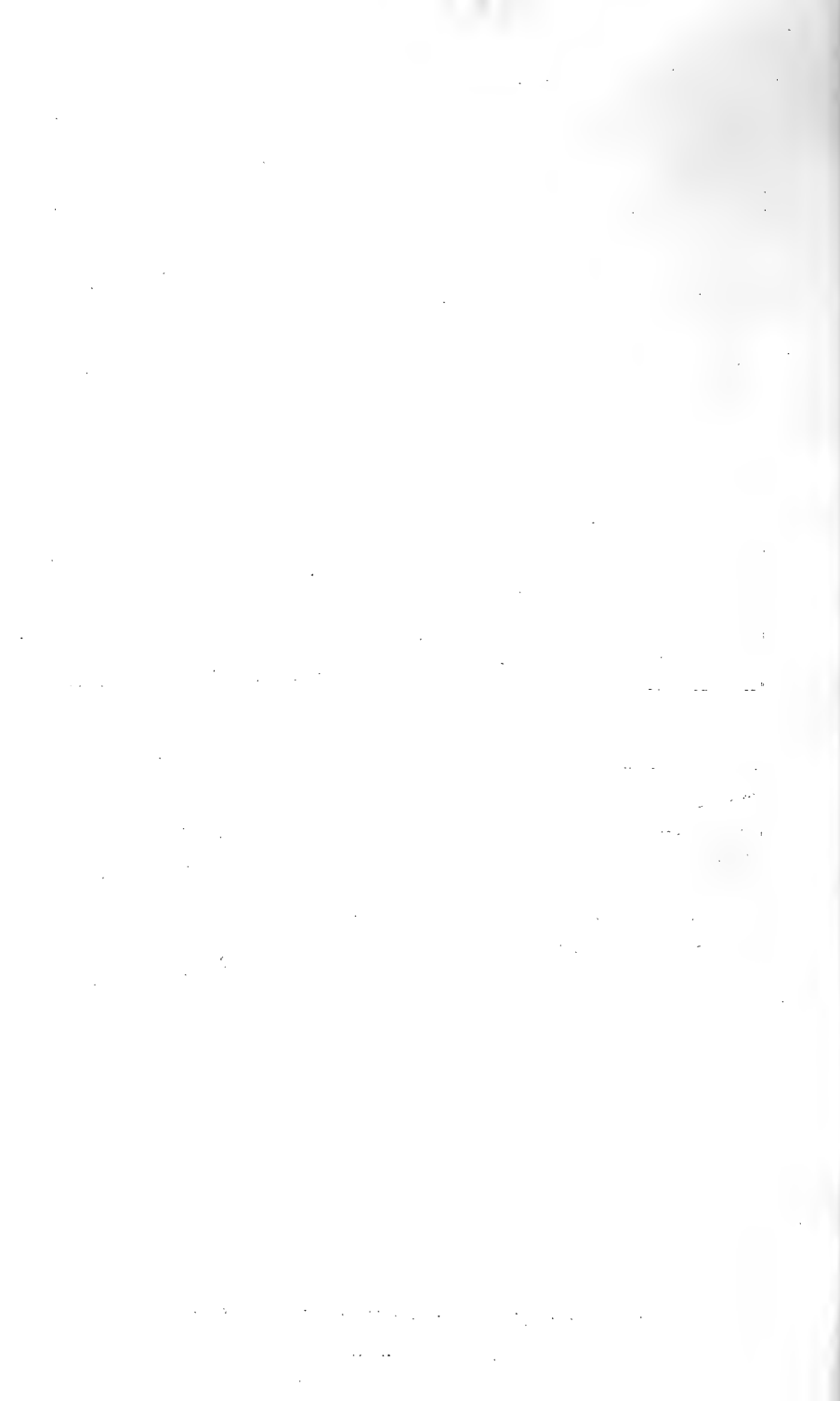
SEPIA BURNUPI, NATAL.



ROSTELLARIA DELICATULA, Nevill.



VIEWS OF THE NORTH END OF HAWES WATER, SILVERDALE,
showing cliffs of Chara and Shell marl.



THE
JOURNAL OF CONCHOLOGY.

VOL. II.

APRIL, 1905.

No. 6.

ROSTELLARIA DELICATULA Nevill.

Notes upon its distribution and limits of variation.

BY JAMES COSMO MELVILL and ROBERT STANDEN.

(Read before the Society, May 11, 1904).

PLATE II.

THIS particularly attractive Gastropod, always inhabiting abyssal dep'hs, was described in 1881,¹ by the late Mr. Geoffrey Nevill, but not figured; his account of it being here transcribed as follows:—

Rostellaria delicatula n. sp.

“Distinguished at once from all the other living species of the genus by its thin, delicate, and translucent substance, in these respects showing a highly important approach to some fossil forms. Colour a pale ochraceous brown, lineated on the last whorl with four narrow white bands, each of which terminates in one of the four projecting digitate processes of the outer lip, one only of these bands appearing in the middle of the preceding four whorls; spire not quite half the entire length, apex moderately acute; whorls $10\frac{1}{2}$, moderately convex, the last conspicuously tumid and like the preceding one, marked with a slight sutural depression, produced at the base into a short canaliculation, relatively less developed than in any of the other known species, this “canal” is slightly tortuously deflected, more conspicuously so than in *R. magnus* Chemnitz; the first three or four whorls are sculptureless, the next three or four inconspicuously

1 Nevill, *Journ. Asiat. Soc. Bengal*, vol. 50, pt. 2, p. 262, 1881.

but regularly spirally striated, striæ about ten in number, filiform and slightly punctured, becoming obsolete on the last two whorls, except at the base of the last of all, where they reappear more coarsely developed than before; there are also five varices, somewhat inconspicuous, at intervals on the last four whorls, which also show, under a lens, minute longitudinal striation, the striæ close set, fine and flexuous; aperture oval, rather large, with the peristome thickened and denticulated with four equidistant, relatively somewhat small, digitate processes.

"Long. 76, diam. 28; from the apex to suture of the last whorl $29\frac{1}{2}$, from base of the aperture to end of the "canal" $6\frac{1}{2}$ mill.

"This highly interesting and very characteristic form, quite unlike any other of the seven known living species of the genus (as restricted) was dredged in deep water off Cheduba, Arrakan Coast, by Surgeon J. Armstrong, late Naturalist to the Indian Marine Survey."

"This species has now become recognised as a quite characteristic inhabitant of the infra-littoral of the Bay of Bengal at and near the 100-fathom contour, as far as this has yet been explored by the 'Investigator,' from Arrakan to the Godávari. The living animal is a bright pink, and it has imparted to the spirit in which it was preserved a beautiful magenta colour, which has stained permanently the packing material, the legs and branchiæ of some Penæi, and the soft tissues of a Chætopod and of some other mollusks, contained in the tin in which it was first placed. The eyes are very large. The animal is possessed of great vitality, and though coming from a considerable depth, lives happily for days in a bucket of sea-water, and appears to be unaffected by prolonged deprivation of water in the moist atmosphere of ship-board.

"The type appears to have been described from an abnormally thin and varicose shell, which also, judging from the slight development of the digitate processes of the outer margin of the aperture, was probably young. The thinness of the type specimen is perhaps to be explained by its having come from a greater depth, our present series showing that the thickness of the shell varies inversely as the depth."¹

"Many specimens in various stages of growth from station 119, 95 fathoms. This form, already noticed to be characteristic of the Bay of Bengal infra-littoral at and near the 100-fathom contour from Arrakan to the Godávari, is now found off the Kistna Delta, about 70 miles further south."²

It has been dredged by Mr. Townsend in various stations as enumerated in the following paragraphs:

1 Wood-Mason and Alcock, *Ann. & Mag. Nat. Hist.* (6), vol. 7, pp. 16-17, fig. 3, 1891.

2 Wood-Mason and Alcock, *Ann. & Mag. Nat. Hist.* (6), vol. 8, p. 444, 1891.

Persian Gulf. Gulf of Oman. Latitude $24^{\circ} 49' N.$, longitude $55^{\circ} 56' E.$, 250 fathoms, mud, all young. Near this sounding six fine examples occurred from 200-400 fathoms.

Off Jask, latitude $25^{\circ} 19' N.$, longitude $58^{\circ} 10' E.$, also south of Ras Jazin at 140 fathoms, 7th April, 1903, many adult, with a few *Conus* (*Conorbis*) *coromandelicus* E. A. Smith (previously only found in the bay of Bengal by Messrs. Wood-Mason and Alcock during the "Investigator" Expedition), and a large number of Echinodermata.

Juvenile examples were rare in shell-sand, which has proved most prolific in new forms of deep-sea mollusca, in the Gulf of Oman. Latitude $24^{\circ} 58' N.$, longitude $56^{\circ} 54' E.$, 156 fathoms, and, likewise, in March, 1904, it was dredged at 175 fathoms, in some abundance, with *Conus coromandelicus* in small quantity.

Off Ras-Maidani, at 180 fathoms, it occurred with a few of the rare *Pleurotoma navarchus* M. & S.¹

Mekran Coast. Latitude $24^{\circ} 59' N.$, longitude $60^{\circ} 58' E.$, 170 fathoms, April 8, 1903, all in juvenile state. No other species of mollusc occurred, but many prawns and shrimps came up in the dredge at the same time.

The mean temperature of the water in the localities affected by this *Rostellaria*, is, according to Mr. Townsend, 62° Fahrenheit.

Mr. Townsend having called our attention to some variability in this species, as regards the number of denticles on the outer lip, a close examination of all the examples received from him shews the following result :—

- (a) lip with three processes (*tridenticulata*).
- (b) „ four „ (*quatuordenticulata*).
- (c) „ five „ (*quinquedenticulata*).

Of these (b) is the normal form as originally described by Mr. G. Nevill, and the proportion of frequency or the reverse seems to be

In (a)	1	:	75	(b).
(c)	1	:	25	(b).

In marking, size, form, and every other particular save that just mentioned, there is a wonderful uniformity in all that we have examined.

Rostellaria curvirostris Lam. and *R. curta* Sowb., also occurring in the same seas, are likewise apt to vary somewhat in the number of denticles on the outer lip, normal examples possessing seven in both instances.

¹ *Ann. & Mag. Nat. Hist.* (7), vol. 12, plate 21, fig. 15, p. 310, 1903. The type, now in the British Museum, is larger and finer than the five or six specimens subsequently dredged, but all were alive. All have deep-sea breaks on the body whorl. It is one of the finest of the abyssal forms of *Pleurotoma*.

THE REV. JOHN HAWELL, M.A., F.G.S., &c.

By BAKER HUDSON.

(Read before the Society, February 8th, 1905).

JOHN HAWELL, first a servant of God, was equally servant of his fellow countrymen and science and history will remain his debtors. A true gentleman, courteous and thoughtful for others, he not only won the hearts of those with whom he was in daily contact but, his sympathies being large, he earned the cordial respect of all who made his acquaintance.

For over twenty years he was the central figure in Ingleby-Greenhow, a little village hiding itself away in a corner of the hills in North Cleveland. It was not, perhaps, a place where there seemed at first glance great possibilities for the naturalist, but Mr. Hawell settled down to work, and very soon convinced his friends that there was opportunity and the man. I have said his sympathies were large, and whilst he made geology his special study, the history and archæology of the district claimed no small share of his attention. In 1889 he edited and published "The Registers of Ingleby-juxta-Greenhow," and within recent years has assisted the Yorkshire Parish Register Society by editing the Registers of Stokesley. In 1891 he was elected president of the Cleveland Naturalists' Field Club, and not a little of the present prosperity of that association is due to his efforts, a fact which was recognised by his re-election over 1893-4, 1895-6. He undertook to edit the "Proceedings" of the club and contributed thereto several valuable papers dealing with the geology, physiography and mollusca of North Yorkshire, but his activities were not merely local, for as a member of the Yorkshire Naturalists' Union and president of the geological section, divisional secretary for N.E. Yorks. he did useful work, besides contributing papers to the "Proceedings of the Yorkshire Geological Society," his last contribution to the literature of palæontology being a paper on "The Bajocian Plant Beds of Yorkshire."

Though a native of Cumberland, Cleveland was very dear to him, and one of his last acts was to bequeath to the Dorman Memorial Museum at Middlesbrough the whole of his large and catholic collection of rocks, minerals and fossils, together with a fine selection of American Unios and a smaller, but fairly complete, collection of local land and freshwater mollusca. He further bequeathed his scientific books to the same institution, thus leaving behind him a memorial which, intended to still serve those of kindred spirit with his own, will ever mark him for honour.

Mr. Hawell died at the early age of forty-nine leaving a widow to mourn his loss.

CONCHOLOGICAL NOTES FROM THE UNITED STATES.

By LIONEL E. ADAMS, B.A.

(Read before the Society, Dec. 14, 1904).

DURING last spring and summer I had the opportunity of studying and collecting land and freshwater shells in the Mississippi valley, from St. Louis to New Orleans, and the results were most interesting. The Mississippi and its tributaries are invariably muddy, muddier than the Nile or Euphrates, or indeed than any rivers I have ever seen, the reason being that the great central plain of North America is composed mainly of post-glacial alluvium (the Loess of the Champlain period). In spite of their muddy character, the British collector will be surprised to find that mussels of the *Unio margaritifera* class flourish exceedingly, and form a large industry. In the main river and its tributaries are found over four hundred species, some of the thickest-shelled species being used for the manufacture of pearl buttons, the leading centre of the industry being Muscatine in Iowa. The fishing is conducted chiefly along the Iowa and Illinois shores of the Mississippi, and in the Iowa and Cedar rivers. The mussels are dredged by drag-rakes, often worked by steam winches. In 1898, 1,434 hands were employed in the button factories in Muscatine. In the same year, 3,950 tons of mussels were sold to button manufacturers, the price averaging £2 per ton.¹

Most of the ponds resemble our British ponds in clay districts, seldom clear, but usually unproductive. Some ponds in St. Louis yielded *Planorbis trivolvis*, which takes the place of our *Pl. corneus*; *Physa heterostropha*, and some *Sphaeria*, resembling our *S. pallidum*, which by the way is probably an American importation.

Land shells are not found by road-sides, or in hedge-banks, which are scarcely ever seen, but must be looked for under logs in woods. I found an abundance of species at the foot of a wooded bluff of limestone, about twenty miles from St. Louis. This spot in flood-time is often fifteen feet under water for a week at a time, yet the shells are always in evidence as soon as the flood has subsided. Rattlesnakes and copperheads infest the bluff, so I was obliged to use a stick to search crevices and turn over loose stones. The monotony of the dead level of the Mississippi valley is relieved by the rising ground on which Vicksburg is situated, undulations on the famous battle-field reaching a height of three hundred or four hundred feet

¹ For the above particulars I am indebted to Mr. H. M. Smith's "Report on the Mussel Fishery and Pearl Button Industry of the Mississippi River," *Bull. U. S. Fish Comm.*, vol. 18, 1889, an abstract of which I am preparing, at the Editor's request, to lay before the Society.

above the river level. The loess of this district is, I believe, known as the "orange sand," and is of great thickness. While exploring the battle-field, I searched for land shells, but did not find a single recent species. However, in the deep road cuttings I found abundance of semi-fossil shells, weathering out of the sandy walls, often at a depth of twenty feet. These were all representatives of recent species, which I have taken living in Missouri, and are interesting, as they are all land shells—loess shells being usually aquatic: *Helix exoleta* Say, *H. tridentata* Say, *H. hirsuta* Say, *H. concava* Say, and *H. solitaria* Say.

In St. Louis and in New Orleans I took two series of *Physa*, very distinct from each other, and not corresponding to any of the very numerous forms in the Natural History Museum at New York, where I took my captures for identification. In this collection there is a very extensive representation of *Ph. heterostrophæ* from all parts of North America, where it varies as much as *Limnæa peregrina* does here. I have lately had the opportunity of comparing my specimens with those in our National Collection at South Kensington, with Mr. E. A. Smith, and we came to the conclusion that both sets of shells belonged to the species *Ph. heterostrophæ*. On the same occasion I had with me some *Ph. heterostrophæ* from Dukinfield, some *Ph. acuta* from Kew Gardens, and some *Ph. acuta* taken by myself at Ostend. Now, each of these five sets of shells was distinct in some particulars from the rest, and yet they blended with each other, so that it was impossible to draw a distinct line between them; and the same blending was noticeable with these five sets with many sets of *Ph. heterostrophæ* and *Ph. acuta* in the museum cases; and the conclusion which we came to was that, as far as the shells go, there is no specific line to be drawn between the two species, a conclusion that I had previously formed. As far as my observation goes, the animals of both species are alike, and I may remark that Moquin-Tandon's description of *Ph. acuta* and Binney's of *Ph. heterostrophæ* are not sufficiently contrastive to be helpful. If further investigation should combine the two species, *Ph. acuta* Drap. has the priority.

C L A M S.

No conchologist can visit the United States without being interested in the subject of clams—*i.e.*, bivalves other than oysters. At the St. Louis Exhibition, in the U.S. Fishery Building, which was one of the most interesting and instructive of the many attractions, there was an exhibit of thirty-two species of clams used as food or bait. They are enumerated in the following list. A set of these was kindly given to me by Mr. H. F. Moore, and presented to the Manchester Museum, by whom the gift has been gratefully acknowledged.

LIST OF SPECIES.

Flat Razor Clam (*Siliqua patula*).—Alaska; California.

Long Clam or **Soft Clam** (*Mya arenaria*).—Atlantic coast to S. Carolina.

Hen Clam or **Surf Clam** (*Spisula similis*).—S.E. of United States. *Spisula solidissima*, found all along the Atlantic coast, is also known as the **Hen Clam** or **Surf Clam**.

Giant Clam (*Tresus nuttalli*).—Pacific.

Florida Cockle (*Cardium robustum*).—Florida.

Giant Scallop (*Amusium magellanicum*).—New Jersey; Labrador.

Scallop (*Pecten ventricosus*).—Pacific.

Hard Clam or **Round Clam** (*Venus simillima*).—This, in California, takes the place of the better known *Venus mercenaria*, the **Hard Clam** of the Atlantic coast. It is also known by the Indian name "Quohog."

Californian Mussel (*Mytilus californicus*).—Pacific coast.

Common Scallop (*Pecten irradians*).—Atlantic.

Common Mussel (*Mytilus edulis*).—Atlantic and Pacific.

Ribbed Mussel (*Modiolus plicatulus*).—Maine; Georgia.

Californian Cockle (*Cardium corbis*).—Pacific.

¹ ——— (*Tivela crassatelloides*).—California.

Florida "Quohog" (*Venus mortoni*).—Florida.

Round Clam (*Saxidomus nuttalli*, *S. aratus*).—California.

Cuneate Clam (*Gnathodon cuneatus*).—Gulf coast of U.S.

¹ ——— (*Platyodon cancellatus*).—California.

Alaska Surf Clam (*Spisula planulata*).—Alaska.

¹ ——— (*Donax lævigata*).—Used for making "clam juice" for flavouring.

¹ ——— (*Meretrix nimbose*).—Florida.

Deep Water Clam (*Cyprina islandica*).—Atlantic.

Horse Mussel (*Mytilus modiolus*).—Pacific and Atlantic.

Pacific Coast Scallop (*Pecten caurinus*).—Pacific.

California Little Neck Clam (*Tapes straminea* and also *Chione simillima*).—California.

Bloody Clam (*Arca pexata*).—Used for bait only, the crimson juice being pungent and injurious as human food.

Razor Shell Clam (*Ensis disectus*).—Used for bait only.

By no means all of these are to be found in all the markets, some being very much less esteemed than others. The clam most commonly met with in the eastern states as far west as the Mississippi is the "hard clam," or "round clam" (*Venus mercenaria*) sometimes known by an Indian term, "Quohog." In contradistinction to this is

¹ These have no specially distinctive names, being sold as simply "clams."

the "soft clam" (*Mya arenaria*), so called on account of the thinness of its shell. This species is so much esteemed that its special culture has been instituted and flourishes, and a series of shells in various stages of growth formed a most interesting exhibit at St. Louis. These two species are found in immense quantities on the North American coasts, the muddy or sandy bays being especially adapted to bivalves. I have eaten our British species of *Mya* and many species of *Venus* and *Tapes*, and found them remarkably good, and I have wondered whether ignorance or prejudice was the cause of their being neglected by even our fishermen, who will often eat limpets (*Patella vulgata*), which I always found remarkably tough. In many parts in the Mediterranean, however, various species of *Venus* are offered for sale in the markets. I noticed with surprise that *Cyprina islandica* was included in the American list, as it is, as far as my British experience goes, very tough and tasteless, and often harbours a large parasitic worm. The horse mussel (*Mytilus modiolus*) is said by the Manx fishermen to be harmful at a certain season of the year, causing a painful swelling of the throat. I am told that the large flat razor clam (*Siliqua patula*) of the Pacific coast is the clam par excellence, but as the only examples I have come across were preserved in formalin I was compelled to forego the experience.

London Branch—Annual Report.—Since our last report eleven meetings of this Branch have been held. During the winter the undermentioned members kindly invited us to inspect their collections:—Dec. 4th, 1903, Dr. Appleton; Feb. 4th, 1904, Mr. J. C. Dacie; March 4th, Mr. T. Mawson Havard; April 8th, Mr. H. W. Parritt. There was a fair attendance at each of these meetings (except that on April 8th) and the members present much appreciated the courtesy of their hosts. On Jan. 8th, 1904, the Rev. Canon Horsley read a paper (illustrated with numerous specimens) on the land shells of Majorca; this has been published in the *Journal of Conchology*. The field meetings were better attended this summer. On May 7th we visited Broxbourne, the weather was very wet and collecting was unpleasant work; however, 28 species of land and freshwater mollusca were noted including *Segmentina nitida*. On June 4th the locality chosen was Grays, Essex, where *Assiminea grayana* occurs in abundance on the river bank with the usual estuarine shells. July 2nd was another very wet day. At Swanley we found swarms of the common snails on the roadsides. Nothing rare turned up, but beautiful series of *Helix hortensis* and *H. nemoralis* were collected, including a large number of the rare band formula 00300 in *H. hortensis*. The August meeting was at Uxbridge, when a fair number of mollusca were collected, including *Vivipara contecta*. On this occasion Mr. F. G. Bridgman kindly entertained the members present to tea at the Piscatorial Society's lodge. The last field meeting was on Sept. 3rd, at Woldingham, 22 species of mollusca were noted, the best finds being *Acanthinula aculeata* and a subscalariform *Helicella virgata*. Our best thanks are due to the Rev. Canon Horsley, who on July 14th exhibited, and afterwards distributed to the members present, a large number of marine shells from Ceylon and the Indian Ocean.—J. E. COOPER, Hon. Sec., 16th Sept., 1904 (*Read before the Society, January 11th, 1905*).

ON THE DATES OF PUBLICATION OF D'ORBIGNY'S
 "MOLL. VIV. ET FOSS,"
 "PALÉONT. UNIV." and "PALÉONT. ÉTRANGÈRE."

By C. DAVIES SHERBORN.

(Read before the Society, February 8th, 1905).

D'ORBIGNY'S "MOLL. VIV. ET FOSS."—According to the *Bull. Soc. géol. France* (3), iii., 1846, 805, parts 1—6 (480 pp.) appeared in 1845. According to the *Bibl. Française*, parts 1—3 were recorded 16 May, 1846, and contained "about 15 sheets and 15 plates." Wiegmann, *Archiv*, 1847, p. 379, says: "Im vorigen Jahresbericht S. 414 ist das erste Heft eines Werkes von d'Orbigny erwähnt worden; Mollusques vivants et fossiles ct. Im Jahre 1845 sind auch bereits die folgenden 6 Hefte, mit denen der erste Band geschlossen ist, erschienen." This evidence is so conflicting that we can get nothing definite, so I suggest that the simplest way to proceed is to accept the dates given by the author himself and date as follows:—

up to p. 432*	d'Orbigny quotes	1845
„ 576	„ „	1846
„ 605	„ „	1847

D'ORBIGNY'S "PAL. UNIV."—According to the *Bull. Soc. géol. France* (3), iii., 1846 (the only record of the appearance of the work that I can find) part 1 was received 16 March, 1846 (p. 381); parts 2 and 3, 18 May, 1846 (p. 499), while on p. 805 of the same volume it is stated that two parts appeared in 1845 containing 160 pp. and 40 plates. Here again I think we should accept the statements of the author as follows:—

up to p. 208*	d'Orbigny quotes	1845
„ 368	„ „	1846
„ 392	„ „	1847

D'ORBIGNY'S "PAL. ÉTRANGÈRE."—This I have not accessible yet. It is obviously on similar lines to the above two works as some of the plates bear the three titles in their head-lines, though with differing plate numbers. I should adopt precisely the same plan of quotation for dates as suggested for the two above named works. The only record that I can find is *Bull. Soc. géol. France* (3), iii., 1846, 499 and 805 and the information there given is that part 1 was received on the 18 May, 1846, and contained 80 pp. and 20 plates. M. Paul Klincksieck, of Paris, has kindly informed me, through M. Justen (Dulau and Co.), "La Pal. étrang. est un extrait de la Pal. Univ. comme l'indique un Catal. de l'éditeur Gide (*pas de Bertrand*) que

* *i.e.* to the end of the sheets on which the year occurs.

je possède. Avec Pal. univers. on a créé ensuite : Moll. viv. et fossiles. Il y a 3 signatures ou numérolations différentes pour les planches ! Publication ultra confuse dont feu le Dr. Paul Fischer m'avait donné la clé ; cela remonte à 15 ans. Je vous envoie ce que j'ai, l'un complète l'autre, les textes sont les mêmes mais les pages ne cadrent pas et l'un de mes textes est incomplet. Inutile de chercher à compléter ou un autre exemple. Publication à peu près inconnu."

Not one of these three works proceeded further than the first volume, they all deal with Cephalopoda, and apparently are formed of the same material in differing arrangements to suit the varying titles. So far as I am able to judge the "Moll. viv. et foss." was the first to appear (a remainder of the text of this was issued by Delahaye in 1855 with a new title page dated 1855 which was pasted on the fly of the original title page, carefully torn out), the "Pal. Univ." and the "Pal. Etrangère" probably coming out together soon afterward.



Pisidium nitidum var. **splendens** in **West Lancashire**.—In Whit-week last, whilst searching for shells in the neighbourhood of Hawes Water, Silverdale, Lancashire, I was fortunate in finding this somewhat rare form. It occurred, along with other freshwater shells, in the ditches and pools in the vicinity of the tarn, and being so very large and light coloured, I was unable to identify it with anything I had seen before. I therefore sent specimens to Mr. C. Oldham, who referred them to the var. *splendens* of *P. nitidum*. Mr. J. W. Taylor, to whom I also sent specimens, confirmed this identification. The shells are lemon coloured, and beautifully striated, the largest measuring length 5 mm., breadth 5.5 mm. The other *Pisidia* occurring with it were *P. obtusale* and *P. gassiesianum* (= *miliurum*). Apart from the discovery of so rare a form, the species is an addition to the census for West Lancashire.—J. WILFRID JACKSON (*Read before the Society*, Nov. 9th, 1904).

Vertigo moulinsiana Dupuy in **Berkshire**.—I am glad to be able to extend the known range of this species to another county, the habitat being almost precisely similar to that in which I discovered it in Wicken Fen. The new locality is near Bradfield in Berkshire, where I obtained it in marshy ground when sweeping the herbage for coleoptera. *Sphyradium edentulum* Drap., of an unusual size, occurred at the same time. Judging by my own experience, autumn sweeping with a brown holland bag on a strong steel frame is a profitable method of obtaining Vertigos.—J. R. LE BROCKTON TOMLIN (*Read before the Society*, November 9th, 1904).

Helicella caperata m. **sinistrorsum**.—Whilst searching an old limestone quarry at Stanwich, Northants, on Saturday last, October 22nd, I found a reversed specimen of *Helicella caperata* var. *lutescens*, also an old and broken specimen of *Ena montana*, which I presume must have been brought with some young beech trees in the vicinity, as it is not recorded for our county hitherto.—Rev. W. A. SHAW (*Read before the Society*, November 9, 1904).

CARL EDUARD VON MARTENS: An Obituary Notice.

By DR. W. KOBELT.

(Translated from the "Nachrichtenblatt der Deutschen Malakozoologischen Gesellschaft," and read before the Society, March 8, 1905).

PLATE IV.

CARL Eduard von Martens was born in Stuttgart, on April 13th, 1831, and was the only son (along with three daughters) of Dr. Georg von Martens, an official in Württemberg Civil Service. The boy, who at an early age showed unusual intellectual power, found the best possible guide in his father, who was highly gifted both as an artist, a naturalist, and an author. His "Journey in Italy" was for a long time in many respects the best extant regarding that peninsula, and is to-day an important source of information for anyone who wishes to learn the condition of Italy one hundred years ago. He had an accurate knowledge of the fauna and flora of Württemberg, and was a keen collector of shells. He transferred his predilection to his son, and this influence was strong enough to overcome that of school. Although young Eduard threw himself with enthusiasm into the study of the dead languages, and although a "philological vein" was clearly perceptible even in his old age, natural science maintained the upper hand. As Meissner states in the biographical sketch published on the celebration of his seventieth birthday, from which the facts of the present notice are largely taken, snails were, even in his school-days, the chief occupation of the boy, and the whole family shared in his work. His favourite sister, Louisa, who died in 1894, and was a gifted painter, retained a special interest in this study throughout her life, and to her pencil his first great work on the mollusca of his journey to Eastern Asia is indebted for its illustrations. Her eager co-operation, however, had this result, that Martens left his own not inconsiderable powers as a draughtsman undeveloped.

In addition to the snails, attention to languages was not omitted. In the autumn of 1849 von Martens was able to enter the University of Tübingen, where he devoted himself to the study of medicine. There was at that time no independent curriculum of natural science, and the naturalists of the first half of the last century were almost without exception physicians or errant theologians. The chief influence exerted on him was that of Quenstedt, the palæontologist, and when the young physician after the State examination in June, 1855, proceeded to the title of doctor, he gained his degree by a dissertation on the distribution of the European land and freshwater Gastropoda. He never once made practical use of his medical qualifications. In 1870 and 1871 he considered the question whether he ought not to devote his professional knowledge to the sick and wounded, but he

did not feel sufficient confidence to do so. In 1872 the University of Rostock showed its insight by conferring upon him the degree of Doctor of Philosophy, *honoris causa*. Soon after his graduation, he removed to Berlin, to study under Johannes Müller, and very soon came into connection with the Zoological Museum, whose director, Liechtenstein, at once recognised his merit, and on the 1st of Nov., 1855, appointed him assistant in that institution, and entrusted to him the care of the department of Mollusca.

From that time his life is inseparably connected with the conchological collection of the Zoological Museum in Berlin, and his whole working power was devoted to it. Even his travels were planned in the interests of the museum. The journey to Italy, which he made with his father and sisters in 1856, was intended firstly to refresh old family recollections in Venetia, and then to see the peninsula as far as Naples in the good old times, when one still drove through the country in a carriage, and actually learned to know it. He then undertook his long journey to the Far East, China, and Japan, on board the "Thetis," which greatly widened his horizon as a naturalist, and provided him with a rich harvest for the Museum; it also taught him very effectively the unpleasantnesses which fall to the lot of an investigator on an expedition whose leader has no sympathy with his pursuits, and rather regards him as a fifth wheel on the waggon. He therefore abandoned the "Thetis" on the 16th March, 1862, and made his way alone through Sumatra, Java, Celebes, the Moluccas, and Borneo, reaching home only at the end of December, 1864.

The working out of his rich collections occupied ten years. He lived the uneventful learned life of the scholar, and its stages were marked only by the appearance of his works. In 1873 he became Privat-dozent; in 1874, Extraordinary Professor; in 1877 he received the title of Second Director of the Zoological Museum; and in 1898 he was made Privy Councillor. From 1883-87 he was temporarily head of the Museum, with the possibility of being nominated First Director, but he willingly gave up the prospect of these administrative duties; the conchological collection was more attractive to him than the title of Director.

In addition to his own collection and a very important one from Albers, he was able to acquire for the Museum, two other large private collections—that of Dunker by purchase, and that of Paetel by gift. The amalgamation and working out of these collections, and the preparation of a catalogue of the whole, supplied material for a lifetime of uninterrupted research. Unfortunately, he was not able to complete this work, and he was not willing to agree to a partial publication. He could only devote a portion of his time to the collection, for after the commencement of the period of colonization, consign-

ments from Eastern and Western Africa, New Guinea, and the Melanesian Archipelago, crowded upon him in an almost alarming manner. Science owes to him a series of important works, embracing almost the whole of the molluscan fauna of these regions, but von Martens often complained that he was constantly occupied with the arrangement of these acquisitions, and had no time for real work. That was his view of the matter; others regard his latest works on Weber's Fresh and Brackish-Water Mollusca of the Indian Archipelago, on the Mollusca of German East Africa, and the Seychelles, and on the Mollusca of Central America as patterns of carefully worked-out faunas, and as "real work" in the highest sense of the term.

But still these investigations constituted only one part of the weight of labour which rested on Martens. We must not forget that he was also the first authority to whom anyone turned who required information not only about mollusca, but also on other zoological questions, and that he gave his views on both important and unimportant questions with inexhaustible patience. For this work he had one very important qualification—he had his knowledge not only in his head, but also systematically arranged on paper. From the beginning of his scientific activity, he had noted down everything which interested him, and that meant practically the whole range of zoology, and arranged the material in small portfolios. When a question arose, he needed only to open the proper receptacle, in order to get the required information. Many zoologists have enjoyed the benefit of this "paper memory," including the author of these lines, in more instances than one.

In spite of several peculiarities which seemed to mark him out as a bachelor, von Martens had the happiness of finding a companion for life in Camilla Wagner, who seemed to have been created exactly to suit him. He lived with her for more than thirty years an ideal married life, and a daughter, who inherited the artistic gifts of the family, completed his happiness.

Distinctions and honours he never sought, but nevertheless they descended upon him in rich measure. His power of work remained with him to the end. It was permitted to him to complete some important works commenced in his later years, and to live out to its natural boundary a rich and happy career. Honour be to his memory, peace to his ashes!

Vallonia excentrica Sterki, in Ireland.—In a parcel of shells which Mr. P. H. Grierson sent me recently to record were specimens of a *Vallonia*, collected by him at Mornington, Co. Meath, in October, 1904. The shells agreed with the description of *V. excentrica* (*antea* p. 82), and Mr. B. B. Woodward, to whom I submitted them, has kindly confirmed my identification. This species probably has a wide range in Ireland, but, so far as I know, has not been recognised hitherto.
—CHAS. OLDHAM (*Read before the Society*, December 14th, 1904).

NOTES ON TAPES.

BY THE REV. CANON HORSLEY.

(Read before the Society, March 8, 1905).

CONVALESCING at Cette during February, and enjoying the sun and the seabreezes on the miles of sandy shore the Mediterranean here presents, I devoted myself largely to the observation of the marine shells of the sea on the one side of the town and those of the Étang (or lagoon) of enormous size, which stretches between Cette and the real mainland on the other. As the great Canal du Midi pours into this the shells herein have a somewhat estuarine character. I know little of marine shells—I might be described, perhaps, as a mere Heliologist—but as of all the terrestrial species *H. explanata* was the only one not entirely hybernating (though *H. pisana* would soon emerge) I collected the numerous bivalves and less common univalves of these shallow and rockless expanses of water. Between sixty and seventy species I distinguished in spite of my ignorance, and in spite of the absence of any landward wind that would cast fresh shells upon the shore. In some places, especially on the Étang, shell beaches were formed, and a tube simply thrust into them came up full of the prevalent forms. Scores of fishermen, perhaps hundreds, seem to spend all their time in gathering shellfish, especially oysters, *Tapes* (called in French “moules”) and mussels. The oysters of the sea command a higher price than those of the lagoon. All three are very largely eaten raw, and provided as hors d'œuvres at the beginning of every déjeuner in a restaurant or hotel. There are here apparently three species of *Tapes*—*T. decussatus*, the large, strongly decussated, form, not so common, and not varying so remarkably in colour and marking, as *T. aureus*. I think there is an intermediate form, *T. intermedius*, to judge by the names in the local (and scandalously unarranged) collection in the Marine Laboratory, established here by the neighbouring University of Montpellier. This may, however, be but a larger form of *T. aureus*. I have separated those that seem to be of this kind. *T. aureus* gains its specific name from the bright yellow colouring of the interior of the shell, but this colouring is by no means constant, in fact, it is hardly found in the majority of specimens. It does not seem to disappear when dead shells bleach upon the shore. The very varying markings and tints of the shells appear in the youngest shells in the same way that the pigment-glands that form the bands of *H. nemoralis* begin to operate directly the shell has left the egg. With regard to the colouration of *T. aureus*, or of its periostracum, I noticed (1) that the tints lost some tone or depth when the animal was extracted. Some that when alive were of a slaty blue, or pinkish lilac colour, were less attractive when

opened and cleaned; (2) that if you boiled the shells to kill the animal, while, of course, the markings remained, the differences of colour largely disappeared. In fact much the same result of a rusty colour followed as when a lobster is boiled. Is this commonly observed amongst marine shells? I have not found it to happen with terrestrial species. And if so, what is its cause? I may mention that no salt was put into the water. *Tapes decussatus* varies but little in colour; *T. aureus* very much. One definitely named variety in each is that in which there is an angular pattern over all the shell. This is var. *texturatus*. *T. aureus* varies greatly. It was an amusement to the old women in the market to see me turning over their mounds of this species in search of well-marked specimens or variations. They are estuarine, or found only in brackish water (though the water of the Étang is so saline that salt-making flourishes here) and they are procured by means of a long pole with a heavy iron rake (teeth about the size of those of a reaping machine) with a bag net beneath. With this they scratch the bottom of the canal or the lagoon (some of them just under my bed-room window) and then with much labour hauling the bag to the side of the boat they wash away the mud, and discarding stones, refuse, and other kinds of shells, they are rewarded by two or three for each laborious scooping. It is hard labour and only a few pints seem to be a day's result. Considering the popularity of this kind of food in all the country round about, one wonders why typhoid does not abound. Into this canal, beneath my windows, through which sea water flows with some rapidity, run drains from every house, and women come across the road to empty their slops. I questioned a merchant on this point, and he admitted that when strangers came and ate "des coquillages" they were liable to typhoid; but that it did not seem to affect the natives. He himself, however, —perhaps from having spent some time in prejudiced England—avoided these molluscs. The mussels also for food are largely scraped from the walls of the canals, which make a Venice of this town.

A Plover with *Anodonta cygnea* attached to its Foot.—Seeing in the "Surrey Mirror," October 21st, 1904, that a peewit had been found on Gatton Park estate with a freshwater mussel attached to its foot, I went the following day to investigate the matter. The keeper shewed me the bird and the mussel, which latter proved to be a three-parts grown *A. cygnea*, measuring $4\frac{1}{4}$ by $2\frac{1}{2}$ inches, which I have pleasure in now exhibiting. The lake on the estate swarms with this species, the *Zellensis* form predominating, and a large part of the shallow end of the lake being dry from want of rain, flocks of plovers come to feed on the exposed shore. The bird in question had plunged its whole foot above the ankle into the upright posterior end of the shell, which had closed upon it. The bird was found about sixty yards away, a helpless prisoner.—LIONEL E. ADAMS (*Read before the Society*, November 9th, 1904).

**THE SUB-GENUS CASMARIA H. and A. Adams
OF CASSIS Lamarck.**

By JAMES COSMO MELVILL, M.A., F.L.S.

(Read before the Society, March 8, 1905).

CASMARIA was instituted by Messrs. H. & A. Adams in 1853 for a series of the lesser helmet shells, the testaceous portion of which, to quote the authors' definition,¹ is "smooth, whorls simple or sub-plicate, spire somewhat elevated, inner lip smooth, outer lip simple usually, or slightly crenate internally." It is equivalent to *Cassidea* Swainson, 1840, in parte, *non* Link, 1807; this last being identical with *Cypræcassis* Stutchbury, 1837, *C. rufa* L. being the type. The name *Cassidea* had previously, however, been used by Bruguière in 1789, as a synonym of the whole genus *Cassis* (Klein, 1753) Lamarck, 1799, taken *en bloc*.

Doubtless it is hard, if not impossible, to create sub-divisions that satisfy in every point. In many respects *C. vibex* L., for instance, shews a near alliance with *C. glauca* L., or *C. coronulata* Sowb., both included in another sub-genus, *Phalium* Link, 1807, *Bezoardica*, Schum., 1817. Both these last are smooth species, once spinosely spirally noded below the sutures and, like *C. vibex*, have the outer lip four or five-spined towards the base. Varices are supposed to be always present, but I have a perfectly smooth example of *C. glauca* without any sign of this, while, on the other hand, Mr. Standen has lately kindly presented me with a very beautifully variced example of *vibex*, perhaps a monstrous form, but scarcely distorted. At all events, the Brothers Adams admit but six species in their catalogue of *Casmaria*, as follows:—

1. *achatina* Lamk.
2. *paucirugis* Menke.
3. *pyrum* Lamk.
4. *quadrata* Link.
5. *turgida* Reeve.
6. *vibex* L.

Of these, (1) *C. achatina* Lamk. is typically very distinct, being smooth, shining, rounded, hardly if ever noded, but variegated and tessellated with light and dark shades of brown and grey, in an areolate manner, lip either smooth or very obtusely denticulate within. Mr. G. W. Tryon, in my opinion, is quite correct in merging under this species, as a good variety only, *C. pyrum* Lamk., marked (3) in the list just given, although in its typical form it looks peculiar, being thinner and more inflated than *C. achatina*, of a uniform bay or pale

dun colour, and varying from being quite smooth to being ornamented with one spiral series of nodules. *C. ceylanica* Lamk., very well figured by Kiener,¹ is a thicker form, lip very incrassate, with large deposit of enamel on the columella, dorsally twice spirally noded, painting obscurely areolate. (2) *C. paucirugis* Menke, again, seems but a form of *C. pyrum*, the style of painting, though obscure, being almost identical.

Since Adams' day, a few additional species of *Casmaria* have been described, amongst them *C. sophie* Brazier and *C. glabrata* Dkr. The former of these is a large, globular, solid, but inflated species, white, smoothish, ornamented with four spiral rows of chestnut blotches on the last whorls; while the latter is a thin, narrow, smooth shell, with elevated spire, and outer lip with no painting, quite smooth and plain. This may very likely be a form of *C. vibex* L., while the former (*C. sophie*) seems a very distinctively marked large variety of *C. pyrum*. I give this opinion with all reserve, never having seen a specimen.

(6) *C. vibex* L. is a most distinct species, the shell being whitish or greyish-brown, shining, varices usually absent, excepting in case of monstrous forms, which occasionally shew a reduplication of lip, outer lip 3-5 spined towards the base, obscurely thrice spirally zoned with dark-grey, and often longitudinally flame-marked and lined, flames usually few and distinct, outer lip varying in incrassation, transversely painted with dark-brown lines.

C. erinacea L. is precisely to this what *C. ceylanica* is to *C. achatina*—a dwarf, much thickened form, spirally noded at the sutures, outer lip often peculiarly incrassate and pronounced. Doubtless Adams considered it a synonym of *C. vibex*, or else, being a Linnean species, they would have taken due notice of it. Amongst many specimens of *C. erinacea* I have handled, are several with a row of tessellated maculations at the suture, and another near the base, forming thus a complete link, so far as marking is concerned, with *C. torquata* Reeve. This Tryon retains as a true species, with some little reservation. In its typical form, *C. torquata* is small, thin, particularly smooth and shining, with the peculiar markings as just given.

C. kalosmodix Melv. was described² in 1883 from the more typical of two examples. Allied as it is, doubtless, to *C. vibex*, and perhaps being best considered as a sub-species, it will always be recognizable, and is to be differentiated by the complete absence of any spines on the lower portion of the outer lip, as well as, in the type, by the very close longitudinal brown lines, these not being flamed or fulgurate, but almost straight. Another example came into my possession last

¹ "Coq. Viv. Cassis," pl. 13, f. 26.

² *Journ. of Conch.*, vol. 4, p. 43.

year, at the sale of the late Mr. Hugh Nevill's collection, at Stevens' auction rooms; this was from Ceylon. It resembles the example in the British Museum (Natural History) in being almost an albino, but the shape more oblong and laterally compressed than in *C. vibex*, and the outer lip are identical in all three. As yet, I know of no other examples extant. (5) *C. turgida* Reeve, quoted on Adams' list, is referred to *C. achatina* by Tryon. I think it should be placed here. It is a large, more inflated form, with decidedly ventricose whorls than is usual, affording it subspecific characters, with the whole edge of the inner lip denticled, the teeth somewhat variable. It is just possible *C. glabrata* Dunker may be a form of this rather than of typical *vibex*.

Lastly, *C. tenuilabris* Menke, 1828, is unknown to me. It is entered in Paetel's catalogue as belonging to the sub-genus *Casmaria*, and reported from Javanese waters. *C. quadrata* Link, mentioned (4) in Adams' list above, I have likewise, so far, failed to identify.

The following is a summary of the conclusions just arrived at:—

CASSIS (Klein) Lamarck.

Sub-genus **Casmaria** H. and A. Adams, 1853.

1. *C. achatina* Lamk.
 - var. *pyrum* Lamk. (sp.).
 - var. *paucirugis* Menke (sp.).
 - var. *ceylanica* Lamk. (sp.).
- 1A. ? Sub-sp. *sophiæ* Brazier (sp.).
2. *C. vibex* L.
 - var. *erinacea* L. (sp.).
 - var. *torquata* Reeve (sp.).
- 2A. Sub-sp. *turgida* Reeve (sp.).
- 2B. Sub-sp. ? *glabrata* Dunker (sp.).
- 2C. Sub-sp. *kalosmodix* Melvill (sp.).

Species vel varietates incertæ:

C. quadrata Link.

C. tenuilabris Menke.



Opercula of *Bithynia tentaculata*.—Messrs. Dean and Jackson in their paper on "A Chara and Shell-Marl Deposit at Haweswater" (*antea* p. 148) mention that in one or two cases the deposit on the beach consisted entirely of opercula of *Bithynia tentaculata*. This reminds me that in July, 1903, I visited Lough Gur, Co. Limerick, and found the shore in one place white with opercula of this species. At various other points along the shore a belt of foamy scum had drifted to the edge of the lough, which, when examined, yielded myriads of opercula together with a few dead shells of the species, and a few empty shells of *Valvata piscinalis* and *Planorbis contortus*.—A. L. MASSY (*Read before the Society*, Feb. 8th, 1905).

INTERNATIONAL RULES OF ZOOLOGICAL NOMENCLATURE

Adopted by the International Zoological Congress.

(Communicated to the Society, March 8, 1905).

PREFACE.

IF it is true that one cannot write a language correctly without knowing the grammar, it is also evident that one cannot express oneself accurately in regard to a science of which one has only an imperfect knowledge of the technical terms. Nomenclature is the grammar of the natural sciences: it was defined for the first time by Linné in his "*Philosophia Botanica*," in 1751. Applied at first only to the vegetable kingdom, it was systematically introduced into the animal kingdom by the celebrated Swede in 1758.

Since that distant epoch, zoology has made great progress; the number of known species of animals has increased enormously; classification, then scarcely even sketched out, has acquired a precision and a complication of which Linné never dreamed. The very rules which he proposed, although they have remained on the whole valid, have been found to fall short of the exigences of modern science.

More than once already it has been felt needful to remodel the Linnean code, and nomenclature has been enriched by new rules answering in a more or less happy fashion to the needs of the period.

This necessity has never been more keenly felt than during the last twenty years, in consequence of the discoveries resulting from the great maritime explorations and the expeditions into the interior of continents previously closed to civilized nations. From this felt want, leaving out of account the old attempt of Rudolphi, and taking note only of recent proposals, the following schemes have arisen:—

1. The rules of STRICKLAND elaborated in 1842-1843 by a commission of which DARWIN was a member, rules which were adopted in 1845 by the American Society of Geologists and Naturalists, and in 1846 by the British Association for the Advancement of Science.

2. The rules relating to Palæontology, elaborated by M. DOUVILLÉ, and adopted by the International Congress of Geology at Bologna in 1881.

3. The rules adopted by the Zoological Society of France in 1881 as the result of a report by MAURICE CHAPER in the name of a Commission of which R. BLANCHARD was a member.

4. The rules adopted in 1885 by the American Ornithologists' Union, and concerned especially with Ornithology.

5. The rules adopted in 1894 by the German Zoological Society after a report by J. V. CARUS, L. DÖDERLEIN, and K. MÖBIUS

6. The Merton rules referring to Entomology, adopted in 1896 by LORD WALSLINGHAM for the publications issuing from his private museum.

It will be seen, therefore, that proposals have not been wanting and we might mention even more of them,¹ but all have made the mistake either of being applicable only to one division of the animal kingdom (such for example as fossils) or of being only the expression of personal opinions or of emanating simply from learned societies acting on their own initiative.

Such a state of things must inevitably be prejudicial to scientific progress, and it is, therefore, easy to understand why the founders of the International Zoological Congress should have considered one of its most urgent duties to be the recasting of the rules of the Zoological Nomenclature, taking account of the animal kingdom in its entirety, and treating the question from an international standpoint.

The first International Congress met at Paris in 1889, and Professor R. Blanchard presented a detailed report,² the discussion of which occupied several days. Notwithstanding the attention devoted to this important question, it was not possible to do more than examine a portion of the work and ratify part of its conclusions.³ The continuation of the discussion was adjourned to the Second Congress, which was fixed for Moscow, in 1892.

On this occasion Professor R. Blanchard presented a new report upon the questions which had been adjourned, the detailed discussion of which occupied several sittings. With very few modifications the conclusions were ratified in their entirety.⁵

The International Congress had thus accomplished an important

1 See the report of R. Blanchard, quoted later on, *Bull. Soc. Zool. France*, vol. 14, p. 213 *et seq.*, 1889.

2 R. Blanchard, "De la Nomenclature des Etres organisés, Rapport présenté au Congrès international de Zoologie," *Bull. Soc. Zool. France*, vol. 14, p. 212-282, 1889. "Rapports présentés au Congrès international de Zoologie," 160 p., 8vo., Paris, 1889 (*cf.* p. 87-157). "Compte rendu des Séances du Congrès international de Zoologie," 1 vol., 513 p., 8vo., Paris, 1890 (*cf.* p. 333-404).

3 "Règles de la Nomenclature des Etres organisés, adoptées par le Congrès international de Zoologie. Compte-rendu des séances du Congrès international de Zoologie," publié par R. Blanchard, Paris, au siège de la Société Zoologique de France, 1 vol., 8vo., 1890 (*cf.* p. 419-424).

4 R. Blanchard, "Deuxième Rapport sur la Nomenclature des Etres organisés," *Mem. Soc. Zool. France*, vol. 6, p. 126-201, 1893.

5 "Règles de la Nomenclature des Etres organisés, adoptées par les Congrès internationaux de Zoologie" (Paris, 1889; Moscou, 1892). *Congrès internat. de Zoologie*, deuxième session, Moscou, 1892 (*cf.* 2e partie, supplément, p. 72-83).

task ; it had established a body of rules which marked indubitable progress. These rules were adopted by the Zoological Society of France, by other learned societies, and by a number of zoologists.

Nevertheless, these rules were at variance in certain particulars with those which had been independently promulgated by the German Zoological Society in 1894. Agreement was urgent, and at the third International Congress at Leyden, in 1895, Professor Schultze called attention to this pressing need. He proposed the nomination of a Commission whose duty it should be to combine in a single code with a common text, issued in three languages, the rules for the denomination of animal forms, established and recommended in different countries and different languages.

The proposal of Professor Schulze was adopted, and on the 18th September, 1895, a Commission was elected, composed of Professor R. BLANCHARD (Paris), Professor J. V. CARUS (Leipzig), Dr. F. A. JENTINK (Leyden), Dr. P. L. SCLATER (London), and Dr. C. WARDELL STILES (Washington).

This Commission met at Baden-Baden from the 5th to the 9th of August, 1897. It decided to propose at the Fourth Congress, which was to meet at Cambridge in 1898, the creation of a Permanent International Commission, composed of at least seven members, which should take account of all propositions regarding nomenclature which might be addressed to the Fifth and any subsequent Congresses, and should also make a report to the Conference on these propositions. The Commission also resolved to ask the Congress at Cambridge to resolve that no project, modification, amendment, or addition to the rules adopted by the International Congress should be brought before the Fifth or any subsequent Congress without having been submitted to the Permanent International Commission at least a year before the meeting of that Congress.

The Conference at Baden-Baden further discussed the code of Nomenclature which the Congress at Leyden had authorized it to establish. Excepting on some secondary questions, it adopted unanimously a body of rules which were to be, and eventually were, submitted to the Congress at Cambridge in 1898. It was further decided to present to the Congress three official versions of these rules—the German by Professor J. V. CARUS, the English by Dr. C. W. STILES, the French by Professor R. BLANCHARD, and it was ruled that in case of doubt regarding their interpretation, the French text should be the standard.

These decisions were faithfully carried out. The three versions above-mentioned were published shortly after the Conference of

Baden-Baden,¹ and Dr. C. W. Stiles made a report to the Congress at Cambridge on the work of this Conference.

Dr. Sclater then proposed to enlarge the Permanent International Commission by the nomination of ten new members, and to remit to it all questions relating to zoological nomenclature and to request it to present a definitive report to the Fifth International Congress.

This motion was adopted; the Congress at Cambridge proceeded to the election of the new members, and the Permanent International Commission was then composed of the following fifteen members:—Messrs. R. BLANCHARD (Paris), J. V. CARUS (Leipzig), R. COLLETT (Christiania), R. HORST (Leyden), F. A. JENTINK (Leyden), F. C. VON MAEHRENTHAL (Berlin), H. SAUNDERS (London), F. E. SCHULZE (Berlin), P. L. SCLATER (London), D. SHARP (Cambridge), E. SIMON (Paris), L. STEJNEGER (Washington), CH. W. STILES (Washington), TH. STUDER (Berne), and R. R. WRIGHT (Toronto).

Professor BLANCHARD was elected President of the Commission, and Dr. C. W. STILES, Secretary.

The Fifth Congress met at Berlin in 1901, when a special section of nomenclature was established, the proceedings of which will be found in the report of that Congress.² Dr. Stiles presented the report on the work of the Permanent Commission, and it was decided not to fill up immediately the places of Messrs. Saunders and Sclater who had resigned. Amongst other matters, all modifications which the Commission had adopted unanimously and which had been submitted to the Congress at Cambridge without arousing opposition, were adopted. Finally, a sub-committee composed of Messrs. BLANCHARD, F. C. VON MAEHRENTHAL, and C. W. STILES was appointed, the duties of which were as follows:—

1. To codify the rules of nomenclature, separating the rules from the recommendations.
2. To draw up an official text in French, German, and English.
3. To introduce any necessary editorial corrections without altering the meaning either of the rules or recommendations.

The task thus laid down was a very delicate one; it could not be carried out by correspondence, and it was absolutely necessary that

1 "Règles de la Nomenclature zoologique proposées au Congrès de Cambridge par la Commission internationale, *Bull. Soc. Zool. France*, vol. 22, p. 173-185, 1897; also published separately.

"Report on Rules of Zoological Nomenclature to be submitted to the Fourth International Zoological Congress at Cambridge by the International Commission for Zoological Nomenclature."

"Bericht über Regeln der Zoologischen Nomenclatur dem Vierten internationalen Zoologischen Congress in Cambridge vorzulegen von der Internationalen Nomenclatur-Commission," *Zool. Anzeiger*, vol. 21, p. 397-411, 1898; also published separately.

2 "Verhandlungen des V. Internationalen Zoologen-Congresses zu Berlin, 1901," Jena, 1902 (cf. p. 874-890).

the three members of the sub-committee should meet and devote to the revision entrusted to them the time required by such a difficult work. Various circumstances combined to prevent such a meeting ; Dr. Stiles in particular was recalled by his official duties to America immediately after the Berlin Congress, and was unable to return to return to Europe until the Congress at Berne, in August, 1904 ; and hence it is that the code of rules which the Congress at Berlin had decided to publish appears only after a delay of three years.

In consequence of the resignation of Messrs. Saunders and Sclater, above mentioned, and of the death of Professor J. V. Carus, the International Commission became reduced to twelve members. A number of these had not actually taken part either in the Congress at Berlin or in that at Berne, and hence the Commission thought it desirable to modify its constitution, and to divide itself by lot into three sections, the members of one of which should retire in succession every three years, and be replaced by members newly elected, those who retired being eligible for immediate re-election ; in this way the continuity of the work of the Commission would be assured.

The Congress at Berne adopted this proposal unanimously, and the course above mentioned was immediately adopted. The twelve members of the Commission were divided by lot into three groups, the first group retiring at once ; seven new members were then elected, so that at the present moment the Permanent International Commission is composed of the following members :—

Retiring in 1907:—Dr. R. HORST (Leyden), Dr. F. A. JENTINK (Leyden), President D. STARR JORDAN (Palo Alto, California), Prof. F. E. SCHULZE (Berlin), Dr. L. STEJNEGER (Washington D.C.).

Retiring in 1910:—Prof. R. BLANCHARD (Paris), Prof. L. JOUBIN (Paris), Dr. CH. W. STILES (Washington, D.C.), Prof. TH. STUDER (Berne), Prof. R. R. WRIGHT (Toronto).

Retiring in 1913:—M. PH. DAUTZENBERG (Paris), Dr. W. E. HOYLE (Manchester), Prof. L. VON GRAFF (Graz), Prof. F. C. VON MAEHRENTHAL (Berlin), Prof. H. F. OSBORN (New York).

Professor BLANCHARD is President of the Commission, and Dr. VON MAEHRENTHAL and Dr. STILES Secretaries. They constitute an Executive Committee which receives all questions relating to nomenclature, and according to circumstances either decides them at once or refers them to the Permanent Commission.

At the end of the Sixth Congress (15-20 August, 1904) Messrs. BLANCHARD, VON MAEHRENTHAL, and STILES remained for some time at Berne in order to complete the task which the Congress had entrusted to them. From the 21st to the 28th of August they met daily at the Zoological Institute of the University. Their task is now

completed, and they hand over for publication the International Rules of Zoological Nomenclature.

These rules are drawn up in three languages, according to the resolutions of the Congress, the French version being the standard in case of uncertainty. They represent the code officially recognised and adopted by the International Congress, and hence they supply for the present needs of nomenclature the most rational and at the same time the most practical basis, being founded as far as possible on common-sense and strict equity. They include, further, two kinds of formulæ which may be easily distinguished: *Rules*, properly so called, the systematic application of which is imperatively needed, for they will introduce into zoology a uniformity now sadly lacking; and *Recommendations*, which are only counsels dictated by experience and the feeling of justice.

In publishing to-day these International Rules, the Congress makes no pretension to having finally completed a definitive task. Just as the rules which were sufficient for the time of Linné are not adequate for our needs, so the code which we consider sufficient to-day will surely be judged incomplete by our successors. Science is constantly progressing, and in its progress new questions arise for which new solutions must be found.

Furthermore, it is impossible to compel the zoologists of different countries to make use of these rules, and the International Commission has no idea of posing as a legal tribunal which would have no means of enforcing its decisions. It considers that it will be sufficient to appeal to the good sense of zoologists and to invoke the interest for science which inspires them, in order to induce them to adopt the rules which have been so long discussed by learned men of all countries, and whose only object is to establish between naturalists a uniformity of language without which science would be only a chaos of vain words.

The International Commission as now constituted will perform the needful duty of studying all questions relating to nomenclature which may arise from day to day; it will study them in a spirit of moderation and be careful to maintain in nomenclature those conservative principles without which there can be neither uniformity nor tradition.

Every zoologist has the right, we might almost say the duty, to submit to it the difficulties which present themselves to him; it is not a tribunal giving sentence without appeal, but a council of friendly colleagues who have made a special study of the principles of nomenclature and are familiar with the difficulties presented by their practical application; it will examine impartially the questions submitted to it, seeking the most judicious solutions according to the recognised rules,

and will submit them in its report to the International Congress, which will then decide the questions with full knowledge.

In consequence of the scattering of its members, the Permanent International Commission is officially represented by its Executive Committee, to which all communications should be addressed. It cannot study the questions with full utility unless they are submitted to it at least a year before the Triennial Congress.

The Permanent Commission is at the present moment occupied with very important questions which will only come up for discussion at the Seventh Congress at Boston in 1907. In order to render this discussion more fruitful it has been decided to publish these questions as soon as possible, in order that all zoologists interested in them may have time for their consideration. There will no doubt be many of these, and it is likely that in many cases the required solution will be suggested by some naturalist who is not a member of the Commission.

In thus making appeal to the enlightened consensus of all zoologists, in holding at the time of each Congress open sittings where all will be able to take part in the discussions, the Permanent International Commission believes that it is doing a most useful piece of work, and will thus establish an agreement which each day will render more complete on one of the most delicate and one of the most fundamental questions of zoology.

RAPHAEL BLANCHARD,

*President of the Permanent International
Commission of Zoological Nomenclature.*

BERNE, August, 1904.

[Questions for the consideration of the Commission may be addressed to Dr. F. C. VON MAEHRENTHAL, Zoologisches Institut, BERLIN.

It is proposed to publish the Rules and Recommendations in the next number of the *Journal*.—W.E.H.]

PROCEEDINGS OF THE CONCHOLOGICAL SOCIETY OF GREAT BRITAIN & IRELAND.

338th Meeting, January 11th, 1905.

Mr. Edward Collier (vice-president) in the chair.

Donations to the Library announced and thanks voted :

"Japanese Oyster Culture," by Dr. Bashford Dean (*from the Secretary*), and the usual periodicals received in exchange.

New Members Elected.

W. Harrison Hutton, 44, Dial Street, Leeds.

W. G. Reynolds, 15, Alfoxton Avenue, West Green, London, N.

Candidates Proposed for Membership.

W. A. Green, 4, Salisbury Terrace, Belfast.

J. G. Hamling, F.G.S., The Close, Barnstaple.

H. M. Walton, B.A., Goodbourne House, Richmond, Yorks.

Resignation.

L. B. Brown.

Members Deceased.

J. G. Brass.

F. P. Marrat.

Papers Read.

"Report of the London Branch."

"Notes on the homing instincts in Slugs and Snails," by Chas. Pannell.

"Freshwater Shells in masses in shell-marl," by R. Welch.

Exhibits.

By Dr. H. Laver : Specimens of *Crepidula fornicata* which appears to be gaining ground in the neighbourhood of Colchester and may perhaps become a nuisance to the oyster fisheries.

A series of varieties of *Helix aspersa* was exhibited by Messrs. Baldwin, Collier, Jackson, Lucas, Moore and Wadsworth.

339th Meeting, February 8th, 1905.

Held by invitation of Mr. Edward Collier at his house.

Mr. Edward Collier (vice-president) in the chair.

Donations to the Library announced and thanks voted :

The usual periodicals received in exchange.

Donations to the Cabinet announced and thanks voted :

Specimens of *Vitrea hammonis* (Ström.) Pilsb. and *Vallonia excentrica* from Edgeworth, Pa., U.S.A., from Mr. G. H. Clapp.

New Members Elected.

W. A. Green, 4, Salisbury Terrace, Belfast.

J. G. Hamling, F.G.S., The Close, Barnstaple.

H. M. Walton, B.A., Goodbourne House, Richmond, Yorkshire.

Papers Read.

"The Rev. John Hawell, M.A., F.G.S.," by Baker Hudson.

"On the Dates of Publication of D'Orbigny's 'Moll. viv. et foss.,' 'Paléont. univ.,' and 'Paléont. étrangère,'" by C. Davies Sherborn.

"Opercula of *Bythinia tentaculata*," by Miss A. L. Massy.

Exhibits.

By Mr. J. Wilfrid Jackson : Very large *Cardium edule* from Ayrshire.

By Mr. C. Oldham, on behalf of Mr. E. W. Swanton : A fine scalariform example of *Hygromia rufescens*, taken at Haslemere, Surrey, 1904.

Mr. J. W. Baldwin also exhibited some curious local varieties.

Mr. Edward Collier (vice-president) in the chair.

Battleti de la Institució Catalana d'Història Natural, nos. 1-24 (except nos. 2, 4-8, 22, and 23); and series 2, vol. 1; and vol. 1, nos. 1, 2; and the usual periodicals received in exchange.

Alexander Abercrombie, Stainswood, Fallowfield, Manchester.

A. T. Daniel.

It was reported that the following names had been struck off the List of Members in terms of Rule 4 :

F. Stanley.

FOR THE YEAR ENDING DECEMBER 31st, 1904.

having been signed by the Auditors, was laid before the meeting.

[illegible]

"Obituary Notice of the late Dr. Ed. von Martens," by Dr. W. Kobelt.

"Prof. Lang's Breeding Experiments with *Helix hortensis* and *H. nemoralis*,"
by A. D. Darbishire.

"Obituary Notice of the late F. P. Marrat," by J. Cosmo Melvill.

"The Sub-Genus *Casmaria* of *Cassis*," by J. Cosmo Melvill.

"Four Colour Varieties of *Cypræa*," by J. Cosmo Melvill.

"The Mussel Fishery and Pearl Button Industry of the Mississippi," by L. E. Adams.

"Additions to the Land and Freshwater Mollusca of Northamptonshire," by the Rev. W. A. Shaw.

"Notes on *Tapes*," by the Rev. Canon Horsley.

"International Rules of Zoological Nomenclature, adopted by the International Zoological Congress."

Exhibits.

By Mr. J. Cosmo Melvill: Species of *Cassis* and *Casmaria*, to illustrate the Paper on that subject; as well as certain uncommon forms, colour varieties, or monstrosities of *Cypræa*:—(1) *C. sulcidentata* Gray var. *xanthochrysa* Melv., 1888. A golden ochreous colour variety; dorsal surface very faintly thrice-banded with darker shade of the same hue; originally in the collection of the late Rev. J. Smythe. (2) *C. tessellata* Swin. A fine live specimen; the dorsal and lateral blotches deep blackish-brown. From the same collection. (3) *C. crossei* Marie. A monstrous New Caledonian form of *C. stolidia* L., being rostrate, $1\frac{3}{4}$ inches in length. (4) *C. cribraria* L. var. *exmouthensis* Melv., 1888. Two examples, one very finely marked, from New Caledonia. (5) *C. pyrum* Gmel. var. *pelitiana* Crosse and Fischer. A dwarf variety, from New Caledonia. (6) *C. caurica* L. Two examples, precisely similar, of a pellucid form, perhaps identical with var. *pallida* Dautzenberg (*Journ. de Conchyl.*, vol. 50, p. 317, 1902). Likewise four very marked and hitherto unnoticed forms, especially a black variety of *C. lynx* L.

By Rev. Canon J. W. Horsley: A fine series of varieties of *Tapes aurea* and *T. decussata* to illustrate his paper; *Helix aspersa* var. *undulata*, semi-transparent and vividly marked, from the Paris market; also a shell of *H. aspersa* which had been blown out to sea, and afterwards cast up again, encrusted with *Serpule* and other marine growths.

By Mr. R. Standen: A set of *Anodonta cygnea*, including a remarkable truncated specimen almost square in shape; and *Unio pictorum*, illustrating growth stages, all from New River, Cheshunt, Herts.

By Mr. Bartlet Span: A fine group of thirteen specimens of *Pteria hirundo* Scopoli, attached to a branch of *Antipathes*, trawled from sixty faths., Bay of Biscay.

By Mr. C. Oldham: On behalf of Rev. W. A. Shaw, a set of shells from Northamptonshire to illustrate his note.

A large number of varieties of *Helix hortensis* were exhibited by Messrs. Ed. Collier, R. Welch, and A. D. Darbishire. The "Oldham" and "Darbishire" sets from the Manchester Museum were also shewn. Mr. J. R. Redding also sent for exhibition a most interesting series of the type form and varieties from Drumcondra, Finglas, Cabra, Royal Canal, and other localities for this scarce Irish species in the Dublin area.

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Journal of Malacology, vol. II, no. 4, 1904.

"Descriptions of some new species of Cingalese and Indian Marine Shells," by H. B. PRESTON [*Cythara*, *Clathurella*, *Thala*, *Nassa* (*Phrontis*) 2, *Murex* (*Ocenebra*), *Coralliophila*, *Micronalia*, *Styloptygma*, and *Mactra* 2, all figd.]. "Descriptions of Twelve new species and one variety of Marine Gastropoda from the Persian Gulf, Gulf of Oman, and Arabian Sea, collected by Mr. F. W. Townsend, 1902-1904," by J. COSMO MELVILL [*Aclis*, *Rissoina*, *Ethalia*, *Omphalius*, *Turritella*, *Eulimella*, *Odostomia*, *Oscilla* 2, *Mumiola*, *Eulima*, *Mangilia*, *Daphnella*, all figd.]. "Note on *Mitra stephanucha* Melv., with description of a proposed new variety," by J. COSMO MELVILL. "On some Non-Marine Shells from the Austro- and Indo-Malayan Region," by E. R. SYKES [*Trochomorpha* 2, *Albersia*, *Planispira* 3,

Obba, *Papuina* 3, *Perrieria*, *Leptopoma* 2, *Ameria*, all figd.]. "The Helicoid Land-Shells of Asia: Corrections and Additions," by G. K. GUDE [*Cathaica sturanyi*, *C. hermanni*, nn.spp.]. "Note on Two varieties of *Arion subfuscus* Drap.," by W. E. COLLINGE.

The Nautilus, vol. 18, nos. 8-10, Dec. 1904-Feb. 1905.

"New forms of *Polygyra* from Alabama," by GEO. H. CLAPP [*P. barbata* n.sp., *P. stenotrema seminuda* n.var.]. "New species of *Buccinum* from the Kuril Islands," by H. A. PILSBRY [*B. inclitum*, *B. chishimanum*]. "On the Northernmost Habitat of *Liguus fasciatus* on the Florida East Coast," by C. B. MOORE. "New Land Snails from North Carolina," by H. A. PILSBRY [*Polygyra appressa tryoniana*, *P. wheatleyi clingmanica*]. "*Agriolimax agrestis* in Colorado," by T. D. A. COCKERELL. "*Margaritana margaritifera* in Pennsylvania," by CHAS. H. CONNER. "*Arion circumscriptus* Johns. (*fasciatus* Nilss. pars)" [new to N.Y.], by T. D. A. COCKERELL. "Albino *Polygyra monodon* and *P. hirsuta*," by T. VAN HYNING. "Geographic Range of *Polygyra tridentata discoidea* in Indiana," by L. E. DANIELS.

"On an interesting Fossil *Unio* [*U. crassidens* Lam.] from Wisconsin," by GEORGE WAGNER. "On the Species of *Martesia* of the Eastern United States," by CHAS. W. JOHNSON [*M. striata*, *M. cuneiformis*, *M. caribæi*]. "Note on the Nomenclature of the Snails usually called *Pupa*," by T. D. A. COCKERELL [*Pupilla* Leach preferred]. "Notes on the Nomenclature of Pupillidæ," by H. A. PILSBRY. "New Species of *Pisidium*" [*P. limatulum*, Alabama], by V. STERKI.

"Sensitiveness of Snails to Weather Conditions," by J. B. HENDERSON, jun. "Note on *Lucina* (*Miltha*) *chilireni* Gray, and on a New Species from the Gulf of California," by W. H. DALL [former from Brazil, not California; species from California is *L. xantusi* n.sp.]. "Further Notes on the Species of *Martesia*," by C. W. JOHNSON [*M. fragilis* and *M. semicostata* to be added]. "Notes on some Preoccupied Names of Mollusks," by W. H. DALL [*Parmulophora* n.n. for *Parmulina*, *Patinigera* n.n. for *Patinella*]. "A New *Oreohelix*," [*O. strigosa metcalfei*, New Mexico], by T. D. A. COCKERELL. "Names in the Pupillidæ," by W. H. DALL. "The Pupillidæ of Risso and Jeffreys," by H. A. PILSBRY.

Journal de Conchyliologie, vol. 52, no. 4, Dec., 1904.

"Variations et cas tératologiques chez le *Murex brandaris* L.," by PH. DAUTZENBURG [8 forms described]. "Notes Critiques et Synonymiques," by C. F. ANCEY.

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"Zwei Nachrufe," by W. KOBELT [Obituary notices of D. F. Heynemann and Ed. von Martens]. "Eine verschollene *Campylaea*" [*C. philippii*, Naples], by W. KOBELT. "Anatomie und systematische Stellung von *Xerocampylaea* Kob.," by P. HESSE [a sub-genus of *Fruticicola*]. "Bücherschau," by O. BOETTGER [critique of Lehmann, "Schnecken u. Muscheln Deutschlands," Zwickau, 1904]. "Schnecken aus dem Tsad-See," by O. BOETTGER [3 spp. recorded]. "Ueber Heterostylie bei Schneckenschalen und ihre Erklärung," by O. BOETTGER. "Verdoppelung eines Auges bei einer *Helix*," by FRITZ WIEGMANN [posthumous]. "Uebelriechende Schnecken," by P. HESSE. "*Stenogyra octona* L. und *Physa acuta* Drap. eingeschleppt in Dänemark," by HENRIK SELL.

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"Belemnite Nomenclature," by G. C. CRICK. "Re-establishment of a discarded British Slug" [*Limax tenellus*]; "Molluscan Fauna of Langstrothdale," by W. DENISON ROEBUCK [List, with localities]. "Mollusca of Driffeld and Neighbourhood," by the Rev. E. P. BLACKBURN [List, with localities].

"*Limax tenellus* in Yorkshire," by J. E. CROWTHER. "North Lincolnshire Mollusca," by the Rev. E. A. WOODRUFFE-PEACOCK [*Anodonta cygnea* and vars. of *Helix*]. "*Helix nemoralis* L., in North-west Lincolnshire," by the Rev. E. A. WOODRUFFE-PEACOCK.

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"Notes on the Mollusca of N.E. County Wicklow," by P. H. GRIERSON [List of species with notes and localities]. "On some Irish Specimens of a large Squid, *Sthenoteuthis pteropus*," by A. R. NICHOLS.

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"Mollusca und Brachiopoda gesammelt von der Schwedischen Zoologischen Polar-Expedition nach Spitzbergen, dem Nordöstlichen Grönland und Jan Mayen im J. 1900," by R. HAGG [*Portlandia kolthoffi*, n.sp.].

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"Notes on South Australian Marine Mollusca, with Descriptions of New Species," part 1, by J. C. VERCO [*Cassidea sinuosa*, *Cancellaria pergradata*, *Stephoma nucleogranosum*, *Nacella crebristriata*, nn.spp.].

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"Excursió Malacològica a Gayá" [15 spp.], and "Algunes espècies del gènere *Helix* recollides a Vilarrodona (Ribera del Gayá)" [23 spp.], by J. MALUQUER Y NICOLAU. "Nova forma d'*Helix* [*H. ripollica*] pera la fauna catalana," by P. FAGOT. "Moluschs terrestres de Menorca (Balears)," by SOLE Y PLA. "Les dents dels moluschs," by D. J. MALUQUER.

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"Moluschs terrestres y d'aigua dolça, recollits en la comarca d'Artesa de Segre," by J. MALUQUER Y NICOLAU [List with localities]. "Alguns moluschs Marins de Masnou," by J. MALUQUER Y NICOLAU [188 spp.]. "Moluschs de Montserrat," by ANTONI DE ZULUETA [7 spp.].

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"Coquilles fossiles trouvées en 1904 dans les sables yprésiens de Saint-Gobain (Aisne)," by —. L'HOMME. "Sur quelques espèces nouvelles ou peu connues des couches calloviennes de Villiers-sur-Mer," by J. RASPAIL. "Sur la *Pupa anglica*, type de la faune dite lusitanienne," by E. MARGIER [to be generically distinguished under *Lauria*].

Proceedings of the Academy of Natural Sciences of Philadelphia, vol. 16, part 2, April-August, 1904.

"The Cell-Lineage and Early Larval Development of *Fiona marina*, a Nudi-branch Mollusk," by D. B. CASTEEL. "The Fossil Land-Shell of Bermuda," by ADDISON GULICK [List of spp., with notes, 6 nn.spp. figured]. "New Japanese Marine Mollusca: Pelecypoda," by H. A. PILSBRY [17 nn.spp. figured].

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"The Published Records of the Land and Freshwater Mollusca of the East Riding, with Additions," by T. PETCH [several spp. recorded additional to last "Census."]

"Beiträge zur Kenntnis der Mollusken-Fauna der Magalhaen-Provinz, II., Die Trochiden," by HERMANN STREBEL (*Zool. Jahrbücher*, Syst., Suppl. 8, p. 121-166, pl. 5 [an elaborate discussion of the forms discovered, 5 nn.spp.].

"Alcuni nuovi fossili sinemurani," by R. BELLINI [several new forms described].

"L'Elveziano nelle colline di Chivasso presso Torino," by RAFFELLO BELLINI [list of fossil shells, some still living in the Mediterranean].

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"Molluscs in South Yorkshire" [few spp. from Shipley Glen].



Freshwater Shells in Masses in Shell-Marl.—I have read with interest Messrs. Dean and Jackson's account of the Hawes Water shell-marl (*antea*, p. 147) as we have so many deposits of this nature in Ireland, usually under peat bogs. There are, however, lakes in Ireland such as Lough Talt, Co. Sligo, where masses of a Chara and a shell-marl form the bottom deposits. At Lough Talt this is dredged up by the farmers to "lime" boggy land with. This particular deposit is very friable, unlike some of the very compact shell-marls of Co. Fermanagh, which are, in some cases, now under tillage, the overlying bog having been cut away. Some of these Irish deposits have much larger quantities of shells in them than others, the species pretty much as given for that at Hawes water. Little "pockets" or masses of shells occur, and the way in which these may collect can be observed on the shores of many lakes, especially on those along the western border of the central limestone plain of Ireland. In Scarriff Bay, Lough Derg, masses of dead shells, very largely composed of *Bithynia* may be found, rapidly undergoing a sort of consolidation, indeed, the first stages of fossilization; the decaying Chara stems and lime deposited in hot weather as the mass dries, compacting the whole pretty firmly together. Large areas of marl, I am told, occur along portions of Lough Cara shores, Co. Mayo, exposed many years ago by drainage operations which lowered the level of the lake. As I hope to visit this deposit this season I will not do more than mention it now. While visiting Portmore Lake, Co. Antrim, some years ago with Mr. R. LI. Praeger I found masses of *Bithynia* stranded on one part of the shores. A small proportion of *Valvata piscinalis* was with them. Afterwards Mr. Praeger came across a shell strand at Menlo on Lough Carrib composed of many species. The Portmore shells were almost all adult, a few, though empty, still had the operculum on the shell. This was at the end of May and as I have found similar masses in early June on shores of Lough Neagh and some Fermanagh lakes I take it these are the adults dying off just as *Limnaea pereger* and some other freshwater species do at this season. In the spring of 1897 great quantities of very young *Limnaea pereger* (possibly killed by late frosts) came ashore in Lough Neagh, all along the shallow rocky portion of Cranfield Point. At some points where tree roots had stopped the drift the mass was fully ten inches deep. This also contained many juvenile *Physa fontinalis* and some *Pisidia*. A little to the north of this large quantities of drift shells collect in some winters in the little bays; a bagful has yielded ten freshwater and about four or five land species.—R. WELCH (*Read before the Society*, January 11th, 1905).

FOUR COLOUR VARIETIES OF CYPRÆA.

BY JAMES COSMO MELVILL, M.A., F.L.S.

(Read before the Society, March 8, 1905).

THE following have mostly been in my possession for many years.

1. **C. asellus** L. var. **vespacea** nov.—Bears a certain superficial resemblance to *C. clandestina* L. var. *artuffeli* Jouss., being almost invisibly thrice-banded, bands very pale-fawn, shape as in ordinary *asellus*. This is almost certainly conspecific with the shell figured by Sowerby ("Thes. Conch.," pl. 30, f. 327) as being in Mr. Jonathan Rashleigh's collection.

2. **C. lynx** L. var. **michaelis** nov.—A rare colour variety, in which a black suffusion more or less clothes the whole dorsal surface. I have only seen six or seven examples of this form, one in Mr. J. Michael Williams' collection, three in that of Mr. R. Standen, one in my own, one in the British Museum, and finally one in that of Mr. R. Cairns.

3. **C. ocellata** L. var. **pretiosa** nov.—A wonderfully beautiful dwarfed and subpelluculent form. Base quite immaculate, with none of the usual lines or maculations, dorsal surface yellowish-fawn, almost transparent, pattern very obscure, the ocellations, few in number, appearing as smaller shaded ochreous spots. Locality unknown.

4. **C. scurra** L. var. **standeni** nov.—A remarkably pale variety, and inclining to translucidity. Base palest fawn, teeth apparently uncoloured, but with a lens the faintest touch of red is perceptible, markings dorsally typical, but lateral maculations absent. Mr. Cairns writes that a specimen in his possession approaches this, but it is evidently of exceedingly rare occurrence.

Do Swans and Ducks eat *Anodonta cygnea*?—I have never heard questioned the propriety of Linné's specific name for the above species, but experience in many branches of natural history tends to make one sceptical of even the most familiar legends, and therefore I was not surprised at the negative results of the following experiments. Having procured an ordinary specimen of *A. anatina*, measuring $2\frac{1}{8}$ by $1\frac{1}{2}$ inches, I proceeded to a neighbouring common, and called up a flock of tame ducks, which came expecting to be fed. I threw the mussel down before them, and they gathered eagerly round it, but after examining it closely they turned away and waddled off with a universal chorus of disappointment. I tried a second flock of ducks and three flocks of geese with exactly the same result. Two couples of tame swans acted in a similar though rather more dignified manner, nor would they have any more to do with a young *A. cygnea*; and yet presumably Linné had some reason for his appellation.—LIONEL E. ADAMS (*Read before the Society*, November 9th, 1904).



Prof. Ed. von Martens.

THE
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JULY, 1905.

No. 7.

PROFESSOR LANG'S BREEDING EXPERIMENTS WITH
HELIX HORTENSIS AND H. NEMORALIS;
An Abstract and Review.

BY A. D. DARBISHIRE, M.A.

(Read before the Society, March 8, 1905).

PROFESSOR Lang's experiments¹ with the above-mentioned snails deserve careful study from the student of organic evolution in general, because they compel him to ask himself what he means when he states that *Helix nemoralis* and *H. hortensis* are distinct species; and from the student of heredity in particular, because the results of breeding different varieties of *H. hortensis* are adduced as a "brilliant confirmation of a part of Mendel's law." A knowledge of Mendelian principles that will enable the reader to understand their connection with Lang's results is easily acquired;² but a clear appreciation of the nature of these principles is not widely distributed. It is in the hope that members of this society may start experiments and obtain results as interesting as those of Professor Lang that I give some account of the manner in which those experiments were carried out.

The snails were kept in wooden boxes, whose floors were perforated, the holes thus made were covered with fine wire gauze; on the floor of the box above the gauze was spread a layer, a few inches thick, of a mixture of peat and wood-earth. A lid, which provided ventilation but prevented the escape of the young, was formed of a horse-hair or

¹ "Ueber Vorversuche zu Untersuchungen über die Varietätenbildungen von *Helix hortensis* Müller and *Helix nemoralis* L." *Festschrift zum siebenzigsten Geburtstage von Ernst Haeckel*, Jena, 1904, p. 439.

² W. Bateson, "Mendel's Principles of Heredity"; A. D. Darbishire. *Manchester Memoirs*, vol. 48, no. 24, p. 19, 1904.

wire net stretched across an iron frame. The mesh of this net must be so small that the young, which are only three mm. in diameter when they emerge, cannot escape through the interstices. These boxes may be kept either outside or indoors; in the latter case, the earth should be sprinkled lightly with water every five or six days. Lang found that families which he kept in some large cellars, where the windows were open winter and summer, flourished better than those out in his garden. The food, which was given every eight or ten days, consisted of carrots, dried hop leaves, or macaroni; and great care was taken to remove from the boxes the remains of the previous meal.

Before starting a breeding experiment with a hermaphrodite animal it is necessary, in order to be certain of the parentage of each individual, to determine whether self-fertilization occurs or not; it was established that in the case of *H. hortensis* and *H. nemoralis* that this did not take place.¹ It was also discovered that the sperm acquired by snail *a* from copulation with snail *b* is capable of living a very long time in the vesicula seminalis of *a*; for example, one of the snails in experiment 49² was fertilized in 1900, and without further copulation produced four families in the years 1900, 1901, 1902, and 1903.

Professor Lang's experiments fall under two headings: (1), matings between varieties of *Helix hortensis*; and (2), crosses between *Helix hortensis* and *H. nemoralis*.

MATINGS BETWEEN VARIETIES OF *H. HORTENSIS*.

The two varieties of this species that were experimented with were the five-banded variety whose formula is 12345, and the bandless variety with formula 00000. Three kinds of pairs can be, and were, made: *a*, 12345 × 12345; *b*, 00000 × 00000; and *c*, 00000 × 12345.

A. 12345 × 12345.³

The author divides the result of this type of mating as well as that of the next into two classes, one in which, while it is certain that the mother of the brood was five-banded, it is not quite certain that the father bore this character; and another, in which it is quite certain that both parents were five-banded. The chief value of the records of broods which fall into the first class lies in the information which they supply as to the order in which the bands appear during ontogeny.⁴

The record of broods which fall into the second class shews that five-bandedness breeds true; for of the 142 snails which reached a diameter of seven mm. all were five-banded with a single exception,

1 p. 443. This and the following references to pages refer to Prof. Lang's memoir.

2 p. 486.

3 pp. 453, 454, and 474.

4 For brevity's sake, I shall denote 12345 by 5 and 00000 by 0.

in which band 3 was missing, a state of affairs which is described by the formula 12045; this occurred in experiment 35, and Lang states that it is the sole instance of what may be regarded as a mutation which has occurred in his experiments.

B. 00000 × 00000.

Here, again, I pass over the description of the cases in which it is not quite certain that the father was unbanded, and proceed to those in which it is certain that both parents were unbanded. The families produced by 0 × 0 fall fairly sharply into two groups: one in which the broods are composed entirely of 0; and another in which both 0 and 5 appear.

To the first group belong experiments 43, 44, and 48; though it must be noted that in experiment 43, out of thirty-five young with formula 00000, one shewed a faint indication of banding¹; that in experiment 44, out of the fifty-seven young, one example shewed an "uncertain indication of bands 1, 2, 3";² and that in experiment 48 none of the young had arrived at anything like maturity.³

To the second group belong, for example, crosses 41 and 42: in the former, of the 78 young, 77 were 0, and one was 00300—this probably was a young stage of an adult whose formula would be 5, because no banded individuals which exceeded seven mm. in diameter had any other formula than 5⁴; another example of the second class on which Lang lays much stress is cross 42, in which of forty-one examples (none of which were larger than 5.5 mm.) thirty-one are without discernible banding, while ten are 00300, *i.e.*, snails which, for the reasons just mentioned, will probably become adult as 5.

C. 00000 × 12345.

The results of this type of mating fall into two classes: one in which all the offspring are 0; and another in which the broods consist of 0 and 5.

To the former class belong experiments 49—54. It must, however, be noted that of the fifty-nine offspring in experiment 49, two shew the faintest suggestion of banding; and that there are ill-defined indications of band 3 in isolated examples of the sixty offspring in experiment 53. Owing to the fact that the young were born before the parents were isolated in experiment 49, it could not be determined whether the brood was produced by the 0 or by the 5 or by both; in experiments 50, 51, and 52, the 0 (of experiment 49) was

1 p. 482.

2 p. 482.

3 p. 484.

4 Moreover, the condition 00300 though perhaps even commoner than 12345 in *Helix nemoralis*, is very rare indeed in *H. hortensis*, in which the variability of the bands is much less definite than in *H. nemoralis*.

the mother; in experiment 53, the 5 (of experiment 49) was the mother, and the records of these families shew, as far as they go, that the result of ♂ 0 × ♀ 5 is not different from that of ♀ 0 × ♂ 5.

To the second class belong experiments 55-66, of which experiment 55 may be taken as an example: of the fifty-nine young, thirty-seven were unbanded, and twenty-two were banded.

*Lang's Interpretation of the Result of the Matings of
H. hortensis.*

Lang maintains that the results of experiments 49-54 shew that unbandedness is a dominant character in the Mendelian sense; and that five-bandedness is recessive. The results of experiments 1 to 38 are consistent with this, for, as we have seen, five-bandedness breeds true, while 0 × 0 sometimes produces only 0, and sometimes 0 and 5, in experiment 42 in the proportion three to one. The appearance of 5's from 0 × 5 in experiments 55-66 is attributed by Lang to an impurity in the strain of the 0's; the possibility that the unbanded parents in these cases may have been heterozygotes, will be discussed later.

CROSS BETWEEN *H. nemoralis* AND *H. hortensis*.

In only one instance has this cross been successful. The specimen of *H. hortensis* had the formula 0¹; the *H. nemoralis* was a 5 with fusion of bands 1 and 2 together, and 4 and 5 together; the lip of the shell was, characteristically, black-brown. There are six offspring that have attained an age at which they can be described.² The following is a summary of their characters:—

- a, In size they are intermediate between the two parents (only four of the six are full-grown).
- b, In three of them the altitude of the shell is much greater than that of either parent.
- c, All of them are unbanded, *i.e.*, like the *H. hortensis* parent.
- d, The lip in the four cases in which it is described, is dark, *i.e.*, like the *H. nemoralis* parent.
- e, The shape and size of the lip is like that of *H. hortensis*.

Lang proceeds from this description of the hybrids, to a discussion of the specific distinctness of *H. hortensis* and *H. nemoralis*, and deals with the evidence for the existence of natural hybrids between them in the field. He cites the work of Coutagne,³ who sums up his conclusions in five theses, three of which I quote here:—

¹ From the fact that no mention to the contrary is made, it may be concluded that the *H. hortensis* had a white lip to its shell.

² p. 497.

³ "Recherches sur le polymorphisme des Mollusques de France." Lyon, 1895.

1. In certain stations, such, for example, as those studied by Müller in Denmark, there exist two groups of *Helices*, of which we will call the one *H. nemoralis* and the other *H. hortensis*, between which intermediates are not found. In the former group, the shell is larger, more depressed, the epidermis less shiny, the lip brown or black; in the latter, the shell is smaller, more globular, more shiny, and the lip is white.
2. In other localities, in the neighbourhood of Orsay, for example, these two groups of *Helices* live together, and still present the same peculiarities and differences; but there occur besides a certain number of intermediate forms, apparently hybrids, the paucity of whose numbers, no less than the complete absence of intermediates in the preceding case, points to the existence of a real genealogical barrier between the two groups.
3. The differential characters which enable one to separate *H. nemoralis* and *H. hortensis* with certainty when they are found associated in one colony are variable and subject to inversion, in such a way that it is not always possible to distinguish with certainty from the shell alone,¹ the *H. nemoralis* from a station *a*, for example, from the *H. hortensis* of station *b* of another locality if one has not got as points of comparison the *H. hortensis* of station *a* or the neighbourhood, and the *H. nemoralis* of station *b* or the neighbourhood.²

An actual case which illustrates the state of affairs on which the third generalization is based is the following:—Coutagne collected in one locality, on April 22, 1879, 242 *H. hortensis* and 26 *H. nemoralis*. Of these 242 *H. hortensis*, 113 were of a lemon-yellow colour, were unbanded, and had dark lips; while of the *H. nemoralis*, nine shells had five bands; three had four bands; seven had three bands; one had two bands; and six had no bands.

Coutagne's verdict on this case is:—"The *H. hortensis* of the form *melanostoma* are not hybrids; for these black-lipped individuals are all unbanded , whereas the *H. nemoralis* are banded in the proportion of sixty-one per cent.³ *If the H. nemoralis were parents of the 113 individuals which I have called H. hortensis var. melanostoma, there is every reason to believe that this character of banding would appear at least in some cases in these 113 individuals.*"⁴

Now, Lang has shewn that the offspring resulting from the union of a five-banded *H. nemoralis* and an unbanded *H. hortensis* are: (a) unbanded; (b) like *H. hortensis* in the form of the shell and mouth;

1 *i.e.*, without the dart.

2 Quoted from Lang's Memoir, p. 499.

3 *i.e.*, in the 26 snails there were 80 bands out of a total possible 130 = 26 × 5.

4 My italics.

and (c) have dark lips. And though this does not prove that Coutagne's 113 black-lipped *H. hortensis* were hybrids, it shews that the argument by which he seeks to prove that they are not, is invalid.

It is not uninteresting to compare, in the light of the suggestion that all black-lipped *H. hortensis* are hybrids, this statement of Ashford :—"The rapid fading of the peristome tint appears to be peculiar to *H. hortensis* as distinguished from *H. nemoralis*. In fact it is an accidental colouring in the former case, and a normal one in the latter",¹ with a number of cases collected by Giard, and described in a paper entitled "Caractères dominants transitoires chez certains hybrides."²

REMARKS ON PROFESSOR LANG'S MEMOIR.

There are two points of view from which the phenomena of heredity may be regarded, the Mendelian and the biometric; and the manner in which material is collected by one who looks at it from the one point of view is not the same as that employed by one who regards it from the other.³ The way in which Professor Lang's data were collected does not admit of their description in terms of the law of ancestral heredity.⁴

The results obtained with the five-banded and unbanded varieties of *H. hortensis* afford an instance of what has been called the Mendelian phenomenon; but when Professor Lang states that they constitute a "brilliant confirmation of a part of Mendel's law" he makes a statement the truth of which depends entirely on our conception of the expression "Mendel's law." If he does not mean any more than that the phenomenon he is dealing with is the same as others which are called Mendelian, I believe his conclusion is justified; but if he means that his experiments afford conclusive evidence of the existence in the gonads of *Helix hortensis* of definite unit-bearing elements representing either five-bandedness or unbandedness, I do not believe that he is justified.

That the explanation of these phenomena is not so simple is made probable by comparing the differences between the parentages in matings of type 0×5 , which gave both 0 and 5, with those which produced only 0. The simple Mendelian explanation which naturally suggests itself, and which Lang himself suggests, is that in the first case the 0 was DD and in the second DR. There is no *a posteriori* evidence for this to be derived from an examination of the parentages

1 "British Land and Freshwater Shells," by L. E. Adams, p. 72. Adams has confirmed Ashford's statement.

2 *Comptes Rendus Soc. Biol.* Séance du 28 Mars 1903, vol. 55, p. 410.

3 See Darbishire, *Manchester Memoirs*, vol. 49, no. 6, p. 17, 1905.

4 Karl Pearson, *Biometrika*, vol. 2, p. 211.

of the supposed DD and DR parents. For the o parent of experiment 49, in which its behaviour is consistent with the theory that it was a dominant, and the o parent of experiment 55 which Lang suggests was a hybrid, both appeared in the brood produced in experiment 28 in which both o and 5 appear, and which appears under the heading of "experiments in which it is certain that the mother was o, but in which it is not quite certain that the father bore this character."¹ There is a rather interesting difference between the ancestry of the snails used in experiment 49 and those used in experiment 55, but it lies not in a difference for which there is only *a priori* evidence in the ancestry of the o, but in an actual difference in that of the 5; for, while in experiment 49, in which the o appeared to be dominant, the 5 was of parentage ♀ 5 × ♂ ? 5; in experiment 55 where the o appeared to be a hybrid the parentage of the 5 was ♀ o × ♂ ? o; and it looks as if the less pure-bred a five-banded snail were, the more power it had of transmitting its five-bandedness; a state of affairs which is comparable with what seems to obtain in the case of my mice, namely, that the more pure-bred an albino is, the less power it has of transmitting its whiteness to its offspring when crossed with a Japanese waltzing mouse. But that this difference in the parentage of the five-banded parent is not the only factor which may account for the production of o and 5 from o × 5 is evident from the fact that in experiment 59 where this occurs the 5 is of parentage ♀ 5 × ♂ ? 5 and not o × o. The only common factor which I can trace in the characters of 5's which when mated with o's have produced o and 5, is that there is a considerable tendency to the fusion of bands in the banded parents in experiments 55 and 59.

Helix nemoralis and *H. hortensis* can be distinguished from one another by the fact that the former usually has a dark, and the latter a pale, lip; but dark-lipped *H. hortensis* are not rare, and pale-lipped *H. nemoralis* are occasionally found. An experienced conchologist can separate the two species at a glance by the general look and size of the shell. But if his verdict is questioned, an examination of the dart decides the matter; the darts of the two species are quite discontinuously distinct. Conchologists believe that the sum of the distinguishing characters justifies them in pronouncing *H. hortensis* and *H. nemoralis* distinct species; and their conviction is not shaken by the discovery that these two snails are sometimes mutually fertile. One looks forward with the greatest interest to Professor Lang's description of the dart of the *H. nemoralis* × *H. hortensis* hybrid. Many of the facts he has already recorded are of great interest. The altitude of the shell in three of the hybrids was greater than that of either parent

—a phenomenon that may be of reversionary significance; one hopes that it will be possible to know exactly how much greater this altitude is by the aid of suitable measurements.

The fact that *o* is dominant over *5* not only within the limits of one species but also when the *o* character is borne by one species and the *5* is borne by another, suggests a line along which a closer knowledge of the nature of unit-characters may be sought. The application of the knowledge acquired by Lang's experiment with *H. hortensis* and *H. nemoralis* to Coutagne's observation is very suggestive, for it shews how necessary to a naturalist who aims at interpreting his observations in the field is the knowledge acquired by experiment in the laboratory.

In conclusion, I express my thanks to Mr. R. Standen for giving me the benefit of his conchological knowledge, and to Mr. E. Collier for giving me the opportunity of examining his collection of *Helix nemoralis*.



Additions to the Land and Freshwater Mollusca of Northamptonshire.

—*Acicula lineata*, February 22, 1898, a single living specimen in a rotten elder stump in Maidwell Dales. *Vertigo substriata*, March 24, 1903, several living specimens from a small colony at Haselbeech; the habitat is in a withy bed amongst the fallen leaves, dead rushes, and moss. In March, 1904, I found several dead shells in company with *V. pusilla* in the rejectamenta of the river at Cranford, close to a similar withy bed. *Ena montana*, a single dead specimen at Stanwick, Oct. 22, 1904. *Aplecta hypnorum*, May 14, 1904, close to Castle Ashby station; smaller specimens, not plentiful, in Sulby Reservoir, in Sept., 1903. *Linnaea pereger*, a pretty lineated form from Naseby Reservoir. *Sphærium pallidum*, July 16, 1904, one specimen at Far Cotton, two near Blisworth station. *Paludetrina jenkinsi*, July 16, 1904, two specimens in the canal near Blisworth station.—[Rev.] W. A. SHAW (Read before the Society, March 8, 1905).

Hydrobia jenkinsi in Rivers.—A young conchologist, Mr. Cecil Birts, of Welling, sends me for identification specimens which are undoubtedly *H. jenkinsi*. The point of interest is that they were found by him in the Cray at Crayford, about three or four miles above where the Cray joins the Thames. The river is fairly rapid and is a clear chalk water. The shell, therefore, seems to be ascending from brackish into fresh water, and I do not think it has been noticed so far away from estuaries—at any rate in Kent, where it was first determined.—[Rev. Canon] J. W. HORSLEY (Read before the Society, May 10th, 1905).

Vertigo substriata (Jeff.) m. **sinistrorsum**.—Amongst a number of *Vertigo substriata*, collected in 1898, at Shipley Glen, Yorks., by Mr. Fred Booth, one full-grown sinistral example occurred, which remained unnoticed until quite recently when Mr. J. Wilfrid Jackson, on looking over the set, detected this great rarity. This makes an interesting record, as I am not aware of any prior instance of sinistrorsity in this species.—R. STANDEN (Read before the Society, May 10th, 1905).

INTERNATIONAL RULES FOR ZOOLOGICAL NOMENCLATURE

Adopted by the International Zoological Congress.

Continued from page 185.

RULES AND RECOMMENDATIONS.

General Considerations.

ARTICLE 1.—Zoological nomenclature is independent of botanical nomenclature in the sense that the name of an animal is not to be rejected simply because it is identical with the name of a plant. If, however, an organism is transferred from the vegetable to the animal kingdom, its botanical names are to be accepted in zoological nomenclature with their original botanical status; and if an organism is transferred from the animal to the vegetable kingdom, its names retain their zoological status.

RECOMMENDATION.—It is well to avoid introducing into zoology as generic names such names as are in use in botany.

ART. 2.—The scientific designation of animals is uninominal for subgenera and all higher groups, binominal for species, and trinominal for subspecies.

ART. 3.—The scientific names of animals must be words which are either Latin or Latinized, or considered and treated as such in case they are not of classic origin.

Family and Subfamily Names.

ART. 4.—The name of a family is formed by adding the ending *idae*, the name of a subfamily by adding *inae*, to the root of the name of its type genus.

ART. 5.—The name of a family or subfamily is to be changed when the name of its type genus is changed.

Generic and Subgeneric Names.

ART. 6.—Generic and subgeneric names are subject to the same rules and recommendations, and from a nomenclatural standpoint they are co-ordinate, that is, they are of the same value.

ART. 7.—A generic name becomes a subgeneric name when the genus so named becomes a subgenus, and *vice versa*.

ART. 8.—A generic name must consist of a single word, simple or compound, written with a capital initial letter, and employed as a substantive in the nominative singular. Examples: *Canis*, *Perca*, *Ceratodus*, *Hymenolepis*.

RECOMMENDATIONS.—The following words may be taken as generic names:

a. Greek substantives, for which the rules of Latin transcription (see Appendix F) should be followed. Examples: *Ancylus*, *Amphibola*, *Aplysia*, *Pompholyx*, *Physa*, *Cylichna*.

b. Compound Greek words, in which the attribute should precede the principal word. Examples: *Stenogyra*, *Pleurobranchus*, *Tylodina*, *Cyclostomum*, *Sarcocystis*, *Pelodytes*, *Hydrophilus*, *Rhizobius*.

This does not, however, exclude words formed on the model of *Hippopotamus*, namely, words in which the attribute follows the principal word. Examples: *Philydrus*, *Biorhiza*.

c. Latin substantives. Examples: *Ancilla*, *Auricula*, *Dolium*, *Harpa*, *Oliva*. Adjectives (*Prasina*) and passed participles (*Productus*) are not recommended.

d. Compound Latin words. Examples: *Stiliger*, *Dolabrifer*, *Semifusus*.

e. Greek or Latin derivatives expressing diminution, comparison, resemblance, or possession. Examples: *Dolium*, *Doliolum*; *Strongylus*, *Eustrongylus*; *Limax*, *Limacella*, *Limacia*, *Limacina*, *Limacites*, *Limacula*; *Lingula*, *Lingulella*, *Lingulepis*, *Lingulina*, *Lingulops*, *Lingulopsis*; *Neomenia*, *Proneomenia*; *Buteo*, *Archibuteo*; *Gordius*, *Paragordius*, *Polygordius*.

f. Mythological or heroic names. Examples: *Osiris*, *Venus*, *Brisinga*, *Velleda*, *Crimora*. If not Latin, these should be given a Latin termination (*Aegirus*, *Göndulia*).

g. Proper names used by the ancients. Examples: *Cleopatra*, *Belisarius*, *Melania*.

h. Modern patronymics, to which is added an ending to denote dedication:

a. Names terminating with a consonant take the ending *ius*, *ia*, or *ium*. Examples: *Selysius*, *Lamarckia*, *Köllikeria*, *Mülleria*, *Stålia*, *Krøyeria*, *Ibañezia*.

β. Names terminating with the vowels *e*, *i*, *o*, *u*, or *y*, take the ending *us*, *a*, or *um*. Examples: *Blainvillea*, *Wyvillea*, *Cavolinia*, *Fatioa*, *Bernaya*, *Quoya*, *Schulzea*.

γ. Names terminating with *a* take the ending *ia*. Example: *Danaia*.

δ. In generic names formed from patronymics, the particles are omitted if not coalesced with the name, but the articles are retained. Examples: *Blainvillea*, *Benedenia*, *Chiajea*, *Lacepedea*, *Dumerilia*.

ε. With patronymics consisting of two words, only one of these is used in the formation of a generic name. Examples: *Selysius*, *Targionia*, *Edwardsia*, *Duthiersia*.

ζ. The use of proper names in the formation of compound generic names is objectionable. Examples: *Eugrimmia*, *Buchiceras*, *Heromorpha*, *Möbiusspongia*.

i. Names of ships which should be treated the same as mythological names (*Vega*) or as modern patronymics. Examples: *Blakea*, *Hirondellea*, *Challengeria*.

j. Barbarous names, that is, words of nonclassic origin. Examples: *Vanikoro*, *Chilosa*. Such words may receive a Latin termination. Examples: *Yetus*, *Fossarus*.

k. Words formed by an arbitrary combination of letters. Examples: *Neda*, *Clanculus*, *Salifa*, *Torix*.

l. Names formed by anagram. Examples: *Dacelo*, *Verlusia*, *Linospa*.

ART. 9.—If a genus is divided into subgenera, the name of the typical subgenus must be the same as the name of the genus (see Art. 25).

ART. 10.—When it is desired to cite the name of a subgenus, this name is to be placed in parenthesis between the generic and the specific names. Example: *Vanessa (Pyrameis) cardui*.

Specific and Subspecific Names.

ART. 11.—Specific and subspecific names are subject to the same rules and recommendations, and from a nomenclatural standpoint they are co-ordinate, that is, they are of the same value.

ART. 12.—A specific name becomes a subspecific name when the species so named becomes a subspecies, and *vice versa*.

ART. 13.—While specific substantive names derived from names of persons may be written with a capital initial letter, all other specific names are to be written with a small initial letter. Examples: *Rhizostoma Cuvieri* or *Rh. cuvieri*, *Francolinus Lucani* or *F. lucani*, *Hypoderma Diana* or *H. diana*, *Laophonte Mohammed* or *L. mohammed*, *Æstrus ovis*, *Corvus corax*.

ART. 14.—Specific names are :

a. Adjectives, which must agree grammatically with the generic name. Example : *Felis marmorata*.

b. Substantives in the nominative in apposition with the generic name. Example : *Felis leo*.

c. Substantives in the genitive. Examples : *rosæ*, *sturionis*, *antillarum*, *galliae*, *sancti-pauli*, *sanctae-helenae*.

If the name is given as a dedication to one or several persons, the genitive is formed in accordance with the rules of Latin declination in case the name was employed and declined in Latin. Examples : *Plinii*, *Aristotelis*, *Victoris*, *Antonii*, *Elisabethae*, *Petri* (given name).

If the name is a modern patronymic, the genitive is always formed by adding, to the exact and complete name, an *i* if the person is a man, or an *æ* if the person is a woman, even if the name has a Latin form ; it is placed in the plural if the dedication involves several persons of the same name. Examples : *Cuvieri*, *Möbiusi*, *Nuñezi*, *Merianae*, *Sarasinorum*, *Bosi* (not *Bovis*), *Salmoni* (not *Salmonis*).

RECOMMENDATION.—The best specific name is a Latin adjective, short, euphonic, and of easy pronunciation. Latinized Greek words or barbarous words may, however, be used. Examples : *gymnocephalus*, *echinococcus*, *ziczac*, *aguti*, *hoactli*, *urubitinga*.

ART. 15.—The use of compound proper names indicating dedication, or of compound words indicating a comparison with a simple object does not form an exception to Art. 2. In these cases the two words composing the specific name are written as one word with or without the hyphen. Examples : *sanctae-catharinae* or *sanctaecatharinae*, *jan-mayeni* or *janmayeni*, *cornu-pastoris* or *cornupastoris*, *coranguinum* or *coranguinum*, *cedo-nulli* or *cedonulli*.

Expressions like *rudis planusque* are not admissible as specific names.

ART. 16.—Geographic names are to be given as substantives in the genitive, or are to be placed in an adjectival form. Examples :

sancti-pauli, *sanctae-helenae*, *edwardiensis*, *diemenensis*, *magellanicus*, *burdigalensis*, *vindobonensis*.

RECOMMENDATION. — Geographic names used by the Romans or by Latin writers of the middle ages are to be adopted in preference to more recent forms. Words like *bordeausia* and *viennensis* are poor, but are not to be rejected on this account.

ART. 17.—If it is desired to cite the subspecific name, such name is written immediately following the specific name, without the interposition of any mark of punctuation. Example: *Rana esculenta marmorata* Hallowell, but not *Rana esculenta (marmorata)*, or *Rana marmorata* Hallowell.

ART. 18.—The notation of hybrids may be given in several ways; in all cases the name of the male parent precedes that of the female parent, with or without the sexual signs:

a. The names of the two parents are united by the sign of multiplication (\times). Example: *Capra hircus* ♂ \times *Ovis aries* ♀ and *Capra hircus* \times *Ovis aries* are equally good formulae.

b. Hybrids may also be cited in form of a fraction, the male parent forming the numerator and the female parent the denominator. Example: $\frac{\textit{Capra hircus}}{\textit{Ovis aries}}$. This second method is in so far preferable that it permits the citation of the person who first published the hybrid form as such. Example: $\frac{\textit{Bernicla canadensis}}{\textit{Anser cygnoides}}$ Rabé.

c. The fractional form is also preferable in case one of the parents is itself a hybrid. Example: $\frac{\textit{Tetrao tetrrix} \times \textit{Tetrao urogallus}}{\textit{Gallus gallus}}$. In the latter case, however, parenthesis may be used. Example: $(\textit{Tetrao tetrrix} \times \textit{Tetrao urogallus}) \times \textit{Gallus gallus}$.

d. When the parents of the hybrid are not known as such [parents] the hybrid takes provisionally a specific name, the same as if it were a true species, namely as if it were not a hybrid; but the generic name is preceded by the sign of multiplication. Example: $\times \textit{Coregonus dolosus}$ Fatio.

Formation, Derivation, and Orthography of Zoological Names.

ART. 19.—The original orthography of a name is to be preserved unless an error of transcription, a *lapsus calami*, or a typographical error is evident.

RECOMMENDATION.—For scientific names it is advisable to use some other type than that used for the text. Example: *Rana esculenta* Linné, 1758, lives in Europe.

ART. 20.—In forming names derived from languages in which the Latin alphabet is used, the exact original spelling, including diacritic marks, is to be retained. Examples: *Selysius*, *Lamarckia*, *Köllikeria*, *Mülleria*, *Stålia*, *Krøyeria*, *Ibañezia*, *Möbiusi*, *Medici*, *Czjzeki*, *spitzbergensis*, *islandicus*, *paraguayensis*, *patagonicus*, *barbadensis*, *färöensis*.

RECOMMENDATIONS.—The prefixes *sub* and *pseudo* should be used only with adjectives and substantives, *sub* with Latin words, *pseudo* with Greek words, and they should not be used in combination with proper names. Examples: *subviridis*, *subchelatus*, *Pseudacanthus*, *Pseudophis*, *Pseudomys*. Words like *subwilsoni* and *pseudo-grateloupana* are not recommended.

The terminations *oides* and *ides* should be used in combination only with Greek or Latin substantives; they should not be used in combination with proper names.

Geographic and patronymic names from countries which have no recognized orthography or which do not use the Latin alphabet, should be transcribed into Latin according to the rules adopted by the Geographic Society of Paris (see Appendix G).

Author's Name.

ART. 21.—The author of a scientific name is that person who first publishes the name in connection with an indication, a definition, or a description, unless it is clear from the contents of the publication that some other person is responsible for said name and its indication, definition, or description.

ART. 22.—If it is desired to cite the author's name, this should follow the scientific name without interposition of any mark of punctuation; if other citations are desirable (date, *sp. n.*, *emend.*, *sensu stricto*, etc.), these follow after the author's name but are separated from it by a comma or by parenthesis. Examples: *Primates* Linné, 1758, or *Primates* Linné (1758).

RECOMMENDATION.—When the name of the author of a scientific name is abbreviated, the writer will do well to conform to the list¹ of abbreviations published by the Zoological Museum of Berlin.

ART. 23.—When a species is transferred to another than the original genus or the specific name is combined with any other generic name than that with which it was originally published, the name of the author of the specific name is retained in the notation but placed in parenthesis. Examples: *Tenia lata* Linné, 1758, and *Dibothriocephalus latus* (Linné, 1758); *Fasciola hepatica* Linné, 1758, and *Distoma hepaticum* (Linné, 1758).

If it is desired to cite the author of the new combination, his name follows the parenthesis. Example: *Limnatis nilotica* (Savigny, 1820) Moquin-Tandon, 1826.

ART. 24.—When a species is divided, the restricted species to which the original specific name of the primitive species is attributed may

¹ Liste der Autoren zoologischer Art- und Gattungsnamen zusammengestellt von den Zoologen des Museums für Naturkunde in Berlin. Berlin, 2 vermehrte Auflage, 8°, 1896.

receive a notation indicating both the name of the original author and the name of the reviser. Example: *Tenia solium* Linné, partim, Göze.

The Law of Priority.

ART. 25.—The valid name of a genus or species can be only that name under which it was first designated in the condition:

a. That this name was published and accompanied by an indication, or a definition, or a description; and

b. That the author has applied the principles of binary nomenclature.

Application of the Law of Priority.

ART. 26.—The tenth edition of Linné's *Systema naturæ*, 1758, is the work which inaugurated the consistent general application of the binary nomenclature in zoology. The date 1758, therefore, is accepted as the starting point of zoological nomenclature and of the Law of Priority.

ART. 27.—The Law of Priority obtains and consequently the oldest available name is retained:

a. When any part of an animal is named before the animal itself;

b. When the larva is named before the adult;

c. When the two sexes of an animal have been considered as distinct species or even as belonging to distinct genera;

d. When an animal represents a regular succession of dissimilar generations which have been considered as belonging to different species or even to different genera.

ART. 28.—A genus formed by the union of two or more genera or subgenera takes the oldest valid generic or subgeneric name of its components. If the names are of the same date, that selected by the first reviser shall stand.

The same rule obtains when two or more species or subspecies are united to form a single species or subspecies.

RECOMMENDATION.—In absence of any previous revision, the establishment of precedence by the following method is recommended.

a. A generic name accompanied by specification of a type has precedence over a name without such specification. If all or none of the genera have types specified, that generic name takes precedence the diagnosis of which is most pertinent.

b. A specific name accompanied by both description and figure stands in preference to one accompanied only by a diagnosis or only by a figure.

c. Other things being equal, that name is to be preferred which stands first in the publication (page precedence).

ART 29.—If a genus is divided into two or more restricted genera, its valid name must be retained for one of the restricted genera. If

a type was originally established for said genus, the generic name is retained for the restricted genus containing said type.

ART. 30.—If the original type of a genus was not indicated, the author who first subdivides the genus may apply the name of the original genus to such restricted genus or subgenus as may be judged advisable, and such assignment is not subject to subsequent change.

In no case, however, can the name of the original genus be transferred to a group containing none of the species originally included in the genus; nor can a species be selected as type which was not originally included in the genus, or which the author of the generic name doubtfully referred to it.

RECOMMENDATION.—In selecting a type, authors should govern themselves by the following :—

a. A genus which contains a species bearing the same name, either as a valid name or as a synonym, takes that species as type.

b. Select as type some species which the original author studied personally, unless it can be definitely shewn that he had some other species more particularly in mind.

c. If the original genus has already been divided without designation of type, the type should be restricted by elimination, namely, by successively rejecting all the species which have already been transferred to other genera; the type is then selected from the species which remain.

If the genus contains both exotic and non-exotic species, from the standpoint of the original author, the type is to be selected from the non-exotic species.

d. Select as type the species which is best described, or best figured, or best known.

ART. 31.—The division of a species into two or more restricted species is subject to the same rules as the division of a genus. But a specific name which undoubtedly rests upon an error of identification cannot be retained for the misdetermined species, even if the species in question are afterwards placed in different genera. Example: *Tenia pectinata* Göze, 1782 = *Cittotania pectinata* (Göze), but the species erroneously determined by Zeder, 1800, as "*Tenia pectinata* Göze" = *Andrya rhopalocephala* (Riehm); the latter species does not take the name *Andrya pectinata* Zeder.

Rejection of Names.

ART. 32.—A generic or a specific name, once published, can not be rejected, even by its author, because of inappropriateness. Examples: Names like *Polyodon*, *Apus*, *albus*, etc., when once published, are not to be rejected because of a claim that they indicate characters contradictory to those possessed by the animals in question.

ART. 33.—A name is not to be rejected because of tautonymy, that is, because the specific or the specific and subspecific names

are identical with the generic name. Examples: *Trutta trutta*, *Apus apus apus*.

ART. 34.—A generic name is to be rejected as a homonym when it has previously been used for some other genus¹ of animals. Example: *Trichina* Owen, 1835, nematode, is rejected as homonym of *Trichina* Meigen, 1830, insect.

ART. 35.—A specific name is to be rejected as a homonym when it has previously been used for some other species or subspecies of the same genus. Example: *Tenia ovilla* Rivolta, 1878 (n. sp.) is rejected as homonym of *T. ovilla* Gmelin, 1790.

When in consequence of the union of two genera, two different animals having the same specific or subspecific name are brought into one genus, the more recent specific or subspecific name is to be rejected as a homonym.

ART. 36.—Rejected homonyms² can never again be used. Rejected synonyms can again be used in case of the restoration of erroneously suppressed groups. Example: *Tenia Giardi* Moniez, 1879, was suppressed as a synonym of *Tenia ovilla* Rivolta, 1878; later it was discovered that *Tenia ovilla* was preoccupied (*Tenia ovilla* Gmelin, 1790). *Tenia ovilla*, 1878, is suppressed as a homonym, and can never again be used; it was still-born, and can not be brought to life, even when the species is placed in another genus (*Thysanosoma*). *Tenia Giardi*, 1879, which was suppressed as a synonym, becomes valid upon the suppression of the homonym *Tenia ovilla* Rivolta, 1878.

1 Besides the special journals and special nomenclators of various groups, authors will find the following publications very valuable in determining whether any given subgeneric, generic or supergeneric name is preoccupied, and if authors will consult these works before publishing new names, considerable confusion and later change of names will be avoided.

C. D. SHERBORN, *Index animalium sive index nominum quæ ab A. D. 1758 generibus et speciebus animalium imposita sunt. Societatibus eruditorum adiuvantibus a Carolo Davis SHERBORN confectus. Sectio I a kalendis januariis, 1758 usque ad finem decembris, 1800. Cantabrigiæ, 1902, 8°.*

S. H. SCUDDER, *Nomenclator zoologicus. An alphabetical list of all generic names that have been employed by naturalists for recent and fossil animals from the earliest times to the close of the year 1879. In 2 parts: 1, Supplemental list. 2, Universal index. By Samuel H. SCUDDER. Washington, 1882, 8°.*

C. O. WATERHOUSE, *Index zoologicus. An alphabetical list of names of genera and subgenera proposed for use in zoology as recorded in the Zoological Record, 1880-1900, together with other names not included in the Nomenclator zoologicus of S. H. Scudder. Compiled by Charles Owen WATERHOUSE and edited by David SHARP, London, 1902, 8°.*

The Zoological Record, XXXVIII. [et seqq.]. Being records of zoological literature relating chiefly to the year 1901 [et seqq.]. London, 1902 [et seqq.], 8°. Index to names of new genera and subgenera.

Register zum zoologischen Anzeiger. Herausgegeben von J. V. CARUS. Jahrgang 1-10 (1878-87), 11-15 (1888-92), 16-20 (1893-97), 21-25 (1898-1902). Leipzig, 1889, 1893, 1899, 1903, 8°.

A card list of names of genera and species published since 1900 is being compiled by Dr. Field of the Concilium Bibliographicum, Zürich.—W.E.H.]

2 A homonym is one and the same name for two or more different things. Synonyms are different names for one and the same thing.

RECOMMENDATIONS.—It is well to avoid the introduction of new generic names which differ from generic names already in use only in termination or in a slight variation in spelling which might lead to confusion. But when once introduced such names are not to be rejected on this account. Examples : *Picus*, *Pica* ; *Polyodus*, *Polyodon*, *Polyodonta*, *Polyodontas*, *Polyodontus* ; *Macrodon*, *Microdon*.

The same recommendation applies to new specific names in any given genus. Examples : *necator*, *necatrix* ; *fercigera*, *fercifera* ; *rhopalcephala*, *rhopaliocephala*.

If from the radical of a geographic name, two or more adjectives are derived, it is not advisable to use more than one of them as specific names in the same genus, but if once introduced, they are not to be rejected on this account. Examples : *hispanus*, *hipanicus* ; *moluccensis*, *moluccanus* ; *sinensis*, *sinicus*, *chinensis* ; *cylonicus*, *zeylanicus*.

The same recommendation applies also to other words derived from the same radical and differing from each other only in termination or by a simple change in spelling. Examples : *cæruleus*, *cøruleus* ; *silvestris*, *sylvestris*, *silvaticus*, *sylvaticus* ; *littoralis*, *litoralis* ; *autumnalis*, *auctumnalis* ; *dama*, *damma* ; *fluvialis*, *fluviatilis*, *fluviaticus*.

APPENDIX.

A.—It is very desirable that the proposition of every new systematic group should be accompanied by a diagnosis, both individual and differential, of said group in English, French, German, Italian, or Latin. This diagnosis should state in what museum the type specimen has been deposited, and should give the museum number of said specimen.

B.—In publications issued in any other language than English, French, German, Italian, or Latin, it is very desirable that the explanation of figures be translated into one of these tongues.

C.—The metric system of weights and measures and the centigrade thermometer of Celsius are adopted as standard. The *micron* (0,001^{mm}) represented by the Greek letter μ , is adopted as the unit of measure in microscopic work.

D.—The indication of enlargement or of reduction, which is very desirable for the comprehension of an illustration, should be expressed in figures rather than by mentioning the system of lenses used.

E.—The indication of enlargement or reduction of an object is usually linear. The sign of multiplication is used for enlargement, and the fraction for reduction. Examples : $\times 50$ indicates that the object is enlarged 50 times; $\frac{1}{50}$ indicates that it is reduced to $\frac{1}{50}$ th.

If it is desired to specify that the enlargement is linear, surface, or mass, this may be done as follows : $\times 50^1$ indicates linear enlargement ; $\times 50^2$ indicates surface enlargement ; $\times 50^3$ indicates mass enlargement.

F.—Transcription of Greek Words.

The following table indicates the manner in which Greek words should be transcribed.

$\epsilon = e$	(ὕαλος)	— Hyalea, <i>not</i> Hyalaea.
$\eta = e$	(πειρήνη)	— Pirena, <i>not</i> Pirina.
final $\eta = a$	(πειρήνη)	— Pirena, <i>not</i> Pirene.
$\theta = th$	(τηθύς)	— Tethys, <i>not</i> Tetys.
$\iota = i$	(βαλῖος)	— Balia, <i>not</i> Balea.
$\kappa = c$	(ἵπποκρήνη)	— Hippocrena, <i>not</i> Hippochrenes.
$\xi = x$	(ξένος)	— Xenus, Xenophora.
$\rho = r$	(πτερόν)	— Pterum.
$\upsilon = y$	(ὕβος)	— Hybolithus, <i>not</i> Hibolites.
$\alpha\iota = ae$	(λιμναῖος)	— Limnaea, <i>not</i> Limnea.
$\alpha\upsilon = au$	(γλαυκός)	— Glaucus.
$\epsilon\iota = i$	(χεῖλος)	— Chilostomum, <i>not</i> Cheilostoma.
$\epsilon\upsilon = eu$	(εὖρος)	— Eurua.
$\omega, \omicron\iota = oe$	(οἰχέω)	— Dioeca, Dendroeca, <i>not</i> Dioica, Dendroica.
final $ou = um$	(ἐφίππιον)	— Ephippium, <i>not</i> Ephippion.
final $os = us$	(ὀμφαλός)	— Euomphalus, <i>not</i> Euomphalos.
$ou = u$	(λουτήριον)	— Luterium, <i>not</i> Loterium.
$\gamma\gamma = ng$	(ἄγγαρεῖα)	— Angaria.
$\gamma\chi = nch$	(ἀγχιστομον)	— Anchistomum, <i>not</i> Angistoma.
$\gamma\kappa = nc$	(ἀγκιστρον)	— Ancistrodon, <i>not</i> Agkistrodon.
$\rho = rh$	(ῥέα)	— Rhea.
$\epsilon = he$	(ἐρμαία)	— Hermaea, <i>not</i> Ermaea.

G.—Transcription of Geographic and Proper Names.

The geographic names of nations which employ the Latin characters are to be written with the orthography of the country in which they originate.

The following rules apply only to the geographic names of countries which have no true alphabet or which use letters that are different from the Latin alphabet.

Names of places, however, which have been established by long usage, preserve their usual orthography. Examples: *Algiers*, *Moscow*.

1.—The vowels *a*, *e*, *i*, and *o*, are pronounced as in French, Italian, Spanish, or German. The letter *e* is never mute.

2.—The French sound *u* is represented by *ü* with dieresis, as in German.

3.—The French sound *ou* is represented by *u* as in Italian, Spanish, German, etc.

4.—The French sound *eu* is represented by *æ*, pronounced as in the French word *œil*.

5.—The long sound of a vowel is indicated by a circumflex accent; the interrupted sound is indicated by an apostrophy.

6.—The consonants *b, d, f, j, k, l, m, n, p, q, r, t, v*, and *z*, are pronounced as in French.

7.—The letters *g* and *s* always have the hard sound as in the French words *gamelle* and *sirop*.

8.—The sound represented in French by *ch* is designated by *sh*. Examples: *sherif, Kashgar*.

9.—*Kh* represents the harsh guttural; *gh* represents the soft guttural of the Arabs.

10.—*Th* represents the sound which terminates the English word path (*θ* in Greek). *Dh* represents the sound which commences the English word *those*.

11.—Aside from such employment (9, 10) of the letter *h* modifying the letter which precedes it, *h* is always aspirated; the apostrophy is therefore never used before a word commencing with *h*.

12.—The semi-vowel represented by *y* is pronounced as in *yole*.

13.—The semi-vowel *w* is pronounced as in the English word *William*.

14.—The double sounds *dj, tch, ts*, etc., are indicated by letters representing the sounds which compose them. Example: *Matshim*.

15.—The *ñ* is pronounced *gn* as in *seigneur*.

16.—The letters *x, c*, and *q* are not used, since they are duplicates of other letters representing the same sounds; but *q* may serve to indicate the Arabic *qaf* and the soft aspirate may be used to represent the Arabic *ain*.

An attempt should be made to indicate as exactly as possible, by means of the letters given above, the local pronunciation without trying to give a complete representation of all the sounds which are heard.



Paludestrina jenkinsi in the New River.—*P. jenkinsi* has found its way into the New River at Hoddesdon, Herts. In company with Mr. Jennings, of Edmonton, I took about fifty specimens from a piece of boarding built into the river bank to support it. The river flows fast at the spot where they were taken, which might account for the fact that none were dredged up on either side of the boarding. The pace of the stream would probably have washed them off the mud and grass-banks. *Ancylus fluviatilis* was found sticking to the boarding in company with the *Paludestrina*, the locality certainly favouring the former rather than the latter, which I have hitherto only taken in sluggish streams and ditches. A further search may reveal that they are strays from a colony living in some slower-flowing reach of the river, that have been washed down the stream, till they found a foothold on the boarding. — ARTHUR G. STUBBS (*Read before the Society*, April 12, 1905).

AN ACCOUNT OF THE MUSSEL FISHERY AND PEARL-BUTTON INDUSTRY OF THE MISSISSIPPI RIVER.

By LIONEL E. ADAMS, B.A.

(Read before the Society, March 8th, 1905).

THE following account of the Mussel Fishery and Pearl-Button Industry of the Mississippi has been extracted from the careful and interesting Report¹ on the subject by Mr. Hugh M. Smith, of the U.S. Fishery Commission, who, when in charge of the U.S. Fishery Building at the St. Louis Exhibition, kindly presented me with a copy.

The manufacture of buttons from the native fresh-water shells began in the United States in 1891, the inauguration of the business being made possible by the high tariff on imported buttons imposed by the tariff bill of 1890. This levied a duty of 2.5 cents per line per gross on shell buttons and 25 per cent *ad valorem*. On account of an abundance of suitable mussels in the vicinity, Muscatine, Iowa, was selected as the site of the first factory and has now become the centre of the industry with more than thirty factories. In 1898 a remarkable development of the business was witnessed, some sixty factories being started, chiefly in Iowa and Illinois. Button making gives employment to large numbers of people, who would otherwise be idle, at what are considered good wages for such labour. It also supports a very important fishery at which many hundred persons make a living. Besides the people thus directly connected with the business, many others in more than a score of towns are benefited, including merchants, machinists, boatmen, draymen, and transportation companies.

While there are probably 400 species of mussels found in the Mississippi and its tributaries, comparatively few are adapted to button-making. Shells must be of sufficient thickness, uniform colour, and sufficient toughness to withstand the necessary treatment without cracking or splitting. Dead shells are useless unless quite fresh.

The principal species used is the "Niggerhead" (*Quadrula ebena*) which is about 3 inches in diameter. This shell, which much resembles *Cyprina islandica*, has a smooth outside; while many other species are covered with warty knobs, which cause the shells to split in the drilling process. Other species which are also utilised, though to a less extent, are the "Bullhead" (*Pleurobema æsopus*); the "Yellowback" (*Lampsilis anodontoides*); the "Black sand shell" (*Lampsilis rectus*); the "Slough sand shell" (*Lampsilis fallaciosus*); the "Mouquet" or "Mougat" (*Lampsilis ligamentinus*); the "Deerhorn" or "Buckhorn" (*Triti-*

¹ "The Mussel Fishery and Pearl-Button Industry of the Mississippi River," *U.S. Fish Commission Bulletin*, vol. 18, for 1898.

gonia verrucosa); the "Butterfly" (*Plagiola securis*); the "Blue-point" (*Quadrula undulata*); the "Hatchet-back" (*Symphinota complanata*); and several species of "Pocket-book clams" (*Lampsilis capax* and *L. ventricosus*). A number of animals prey on the mussels, among them the muskrat, mink and the racoon, the muskrat being specially destructive. Catfish are also said to eat mussels, and hogs are very injurious in some places. During floods shifting banks of mud and sand often cover the mussel beds and so destroy vast quantities. The pollution from city refuse is perhaps the most serious cause of damage. In 1897 there were, between Burlington and Clinton, in Iowa, 300 mussel fishermen, and in 1898 the number between Fort Madison and Sabula was 1,000. At Muscatine alone 100 were employed. When the fishermen find a good mussel-bed they sometimes earn \$30 a week, the probable average, however, being about \$10 a week. To secure the mussels the men use large hand rakes, "tongs" and sometimes large rakes hauled by a windlass. The hand rake has a wooden handle 14 to 20 feet in length, the head of the rake having 12—14 iron teeth five inches long, and the head also forms a basket of wire netting to secure the shells. The rake is used from an anchored boat; the handle is placed over the fisherman's shoulder and the rake is placed upstream to the full length of the pole. The man then works the rake towards his boat, being aided in this by the action of the current on a broad wooden piece nailed crosswise near the base of the handle. The "tongs" or "scissor-rakes" are used in water from 10 to 15 feet in depth. They are formed of two rakes meeting when the scissors are closed.

The large "drag-rake" worked with a windlass has the appearance of a flat cage, with long teeth projecting obliquely downwards from the lower margin. There is one large rake at Muscatine worked from a steam scow. Another curious contrivance is the "Crowfoot." It consists of an iron rod, six feet long, to which are attached at intervals of about six inches a series of four-pronged hooks, somewhat resembling the large "triangle" used for pike fishing. At the ends of the iron bar a rope is tied and to the middle of this is fastened the rope by which the instrument is pulled along. The fisherman throws the "crowfoot" overboard and allows the boat to drift down the stream dragging the instrument with it, the hooks, as they pass over the open mussels, enter the shells which close upon them and are thus secured.

In winter mussel fishing is carried on through the ice by means of the long hand rake. The following account will show how remarkably prolific a mussel bed may be. At Leclaire, Iowa, in 1899 there was a bed about a mile long and 100 yards wide which had been worked

for several years, winter and summer. On one occasion, in the winter of 1898—99, 142 men were digging mussels at one time, and up to the latter part of February they obtained 500 tons. One man can dig 600 to 800 pounds of shells daily on such a bed. Some fishermen have large house-boats which are moored at places convenient to the fishing-grounds and serve as dwelling houses for the family. After capture the mussels are taken ashore and boiled for fifteen minutes in large iron tanks, after which the animals are extracted, and the shells taken to the market or the factory. The "meats," as the animals are termed, are mostly wasted, though in some places they are used as food for hogs and poultry, and a certain amount are salted down as bait for sea fishing. It will be readily understood that such constant fishing has considerably reduced the supply of mussels in many sections, and a period of close time is under consideration. The decrease in supply has been brought about not only by the unremitting activity of fishing operations during the spawning time, but by the wanton destruction of shells too small for manufacturing purposes, enormous quantities being left on the ice to freeze and die. Moreover the growth of the shells is very slow, the time required for a "nigger-head" to reach a size of three inches being not less than ten or twelve years, while a shell 4.5 inches in diameter is from fifteen to eighteen years old.

The prices which the fishermen receive for the shells vary considerably, depending on the supply and demand, and on the species of shell. The standard is the "niggerhead." In 1897 the market value of this species in Muscatine ranged from 40 to 62 cents per 100 lbs. Shells were cheaper in 1898 than at any previous time, but in February, 1898, there was a scarcity of shells at the factories and prices went up to \$18 and \$20 per ton. By July, 1898, the prices had fallen to 30 cents per 100 lbs. for small "niggerheads" and 35 cents for large ones. The ruling prices for other shells in 1897 were, per 100 lbs., as follows: Sand shells, \$1.70; muckets, 30 cents; deerhorns, \$2; pocket-books, 50 cents. In 100 lbs. of sand shells there are about 900 valves; of niggerheads 970 to 1,000 valves. In 1897 there were 3,817 tons of mussels sold for \$43,998, and more than this quantity during the first six months in 1898.

At the factories the shells are stored in covered sheds, the different kinds being usually kept in separate bins. Boys then sort the shells in sizes, three sizes of niggerheads being usually recognised. The sorted shells are placed in barrels of fresh water for three to six days to render them less brittle. The next step is the cutting or sawing of the rough "blanks," during which process the shells have to be kept wet with a constant jet of fresh water. The saws are hollow circular

tubes with teeth at one end which, as they rotate in a lathe, are pressed against the shells, and the "blanks" thus cut out are forced back through the tubes into a receptacle. The daily capacity of the largest factories is 700 to 1,000 gross of finished buttons. The unit of measure of the size of buttons is the "line," which is one-fortieth of an inch (not one-twelfth). From 100 lbs. of niggerheads 34 gross of 16-line buttons or 15 gross of 24-line buttons may be cut. One medium sized niggerhead can be cut into four or five 18-line or 20-line blanks. The largest deerhorns may be cut into 25 or 30 blanks. In the factories from 30 to upwards of 200 people are employed, males and females being in about equal numbers. The best wages are paid to cutters, who are always men, 5 to 10 cents a gross (14 dozen) being paid for "rough blanks" according to size. Skilled men can cut 150 to 200 gross per week and can earn \$15, but the average is \$8 to \$10. The average wholesale price for finished buttons is double that of the blanks of corresponding size.

The second step in the making of a complete button is the dressing or grinding of the back of the blank to remove the epidermis and make an even surface, to accomplish which each blank has to be held with the finger against a revolving emery wheel.

Turning or "facing" is the next process, similar to preceding, gives to the front of the button its form including the central depression. This is followed by drilling three or four holes for the thread. The final polishing is done by causing a quantity of buttons to rotate together in a vessel containing a chemical—possibly an acid.

From 50 to over 90 per cent. of material is waste after the blanks have been cut and the accumulation of this is often a nuisance. A certain proportion is utilised for road making and some for feeding poultry. The fine powder left after drilling, grinding, &c., being almost pure carbonate of lime has been esteemed highly as a fertilizer.

The United States Fish Commission, though it has no jurisdiction over the Mussel Fishery (this being vested in the States concerned), has given in this Report some exceedingly wise and practical recommendations regarding the measures that seem necessary for preventing the further depletion of the Mussel beds—suggesting (1) The prohibition of the gathering of small Mussels; (2) A period of close time at the spawning season; (3) Prevention of damage by sewage and factory refuse; (4) A restriction of the depletion by prohibiting the shipment of Mussels to distant States; (5) Recommendation of care and economy in cutting out the blanks.

THE MARINE MOLLUSCA OF TENBY AND NEIGHBOURHOOD: A FURTHER CONTRIBUTION.

By J. WILLIAMS VAUGHAN.

(Read before the Society, December 9, 1903).

I HAVE been able to add several species to the list given by Mr. Bartlett Span in his paper read before the Society on the 8th of March, 1899, and thanks to his kindness I am also able to give the result of his further researches. As Mr. Span remarks, this is a difficult and dangerous coast to dredge properly, especially this year, which has been so stormy; but if the dredge could have been properly worked I have no doubt a considerable number of species would have been added to the list, which now consists of 227 species.

I am anxious that my list should be as complete as possible, and if any member happens to have any species from Tenby or the neighbourhood not included in either list, I should be much obliged if he would let me have the name and exact locality.

I have to thank Mr. J. T. Marshall for his kindness and courtesy in naming and verifying any doubtful species. The arrangement and nomenclature are those of the Society's recently published "List of British Marine Mollusca."

Callochiton lævis. Tenby, dredged.

Craspedochilus cinereus. Common everywhere.

Acanthochites fascicularis v. *gracilis*. Milford Haven.

Modiolaria costulata. Freshwater West, living.

M. discors. Near Manorbier.

Crenella rhombea. Freshwater West; one valve.

Turtonia minuta. Freshwater West, in sea-weed washings.

Goodallia triangularis. Carmarthen Bay, Freshwater West.

Isocardia humana. Trawled off the Smalls.

Lucina borealis v. *gibba*. Caldy Roads, dredged living.

Lepton squamosum. Milford Haven.

Syndosmya prismatica. Tenby sands.

Tellina crassa. Milford Haven.

T. donacina. Milford Haven, odd valves.

T. pusilla. Caldy, found by Mr. J. E. Cooper.

Meretrix chione. Goodwick, odd valves.

Venus fasciata v. *radiata*. Freshwater West.

V. casina. Freshwater West; Milford Haven.

Tapes aureus. Caldy, found by Mr. J. E. Cooper.

T. pullastra v. *ovata*. Milford Haven.

Cardium nodosum. Milford Haven, living; Freshwater West, odd valves.

C. norvegicum v. **gibba.** Milford Haven.

Cultellus pellucidus. Milford Haven; Goodwick.

Teredo megotara. Skomer Island, drift wood.

T. malleolus. Freshwater West, drift wood.

T. bipinnata. St. Bride's Bay, drift wood.

Calliostoma montagui. Freshwater West; Milford Haven.

Laconia parva. Freshwater West.

Phasianella speciosa. One specimen of this shell, which is, I believe, a common Mediterranean species, was found by Mr. Span on a stone covered with sea-weed, at very low tide-mark at Lydstep Haven; the operculum is complete, and Mr. Span has no doubt it was a living shell; it was submitted to and identified by Mr. J. T. Marshall.

Alvania cancellata. Freshwater West.

A. reticulata v. **calathus.** Freshwater West.

A. punctura. Freshwater West; Carmarthen Bay.

Manzonella zetlandica. Freshwater West.

Zipporia membranacea. Carmarthen Bay.

Setia fulgida. Freshwater West, sea-weed washings.

Barleeia rubra. Freshwater West, in sea-weed washings, living.

Paludinella littorina. Sand Top Bay, Caldy.

Paludestrina stagnalis. Mudflats, mouth of Laugharne River.

Skenea planorbis. Freshwater West, in sea-weed washings, living.

Trivia europæa v. **minor.** Freshwater West.

Natica catena. A scalariform monstrosity, similar in shape to *Vivipara vivipara*, was found by Mr. Span, at Laugharne.

N. alderi v. **lactea.** Milford Haven.

Odostomia acuta. Tenby, dredged.

O. plicata. Caldy, in shell-sand, rare.

Brachystomia ambigua. Freshwater West.

B. angusta. Freshwater West.

Ondina warreni. Caldy, sand.

Pyrgulina decussata. Milford Haven.

Spiralinella spiralis. Freshwater West.

Turbonilla pusilla v. **cylindrata.** Freshwater West.

Eulimella commutata. Freshwater West.

Eulima bilineata. Freshwater West.

Tritonofusus propinquus. Off the Smalls, good specimens.

T. jeffreysianus. Lougharne, one much worn; Tenby sands, two; off the Smalls, living.

Trophon clathratus. Off Caldy Point, dredged; Milford Haven.

- Nassa pygmæa.** Freshwater West ; Milford Haven.
Bela rufa v. **prælonga.** Freshwater West.
Mangilia striolata. Freshwater West ; found by Mr. J. E. Cooper.
Clathurella leufroyi. Freshwater West.
C. reticulata. Freshwater West ; Milford Haven.
C. purpurea. Freshwater West.
Sepia officinalis. Carmarthen Bay, trawled.

PROCEEDINGS OF THE CONCHOLOGICAL SOCIETY OF GREAT BRITAIN & IRELAND.

341st Meeting, April 12th, 1905.

Mr. Edward Collier (Vice-President) in the chair.

Donations to the Library announced and thanks voted :
 The usual periodicals received in exchange.

Donations to the Cabinet announced and thanks voted :
 Specimens of *Avicula hirundo*, from Mr. Bartlet Span.

New Member Elected.

Alexander Abercrombie, Staneswood, Fallowfield, Manchester.

Candidates Proposed for Membership.

Louis A. Breun, 4, Greek Street, Soho Square, W.

C. N. Bromehead, Merton College, Oxford.

W. J. Kimber, Aldinga, South Australia.

Resignation.

J. C. Blackshaw.

Papers Read.

"Notes on the West Cornwall District," by C. E. Wright and Lionel E. Adams, B.A.

"Mollusca collected at Cette, Herault, S. France, in February, 1905," by the Rev. Canon Horsley.

"*Paludestrina jenkinsi* in the New River," by A. G. Stubbs.

Exhibits.

By Mr. P. H. Grierson : *Succinea oblonga* from Trim, Co. Meath ; *Amphipeplea glutinosa* of unusually dark colour, with very compact and solid shells, *Helicella itala* var. *hyalozonata*, and *Physa fontinalis*, type and var. *albina*, from Longwood, Co. Meath, Ireland.

By Mr. C. Oldham : *Amphipeplea glutinosa*, from Packington, Worcestershire, collected by the late G. S. Tye, September, 1895.

By the Rev. W. A. Shaw : *Vertigo angustior* and *V. antiovertigo*, collected from molehills in a marshy piece of ground at Haselbeech, Northamptonshire, on April 1st, last, in company with *V. pygmæa*. The above species have since been discovered in association in another similar spot in the vicinity.

By Mr. R. Cairns : A set of shells from the glacial drift deposits in the cliffs at Blackpool, including *Cypræa* (*Trivia*) *europæa* in good condition.

By Mr. F. Booth : A fine set of *Sphaerium pallidum*, from the canal, Salter-hebble near Halifax.

By Mr. H. Bolton : *Limnæa*, *Planorbis*, *Ampullaria*, *Physa*, and *Limnicolaria volhfsi*, from Buda, Uganda.

By Mr. A. G. Stubbs : A beautiful series of water-colour sketches from nature of the British land and freshwater shells.

342nd Meeting, May 10th, 1905.

Mr. Edward Collier (Vice-President) in the chair.

Donations to the Library announced and thanks voted :

"Report on a small collection of Helicoids from British New Guinea," "Descriptions of nine New Species of Helicoid Land Shells," and "The Helicoid Land Shells of Asia : Corrections and Additions," by G. K. Gude (*from the Author*) ; and the usual periodicals received in exchange.

Donations to the Cabinet announced and thanks voted :

Examples of *Limnæa peregra* from Mr. J. E. Cooper.

New Members Elected.

Louis A. Breun, 4, Greek Street, Soho Square, London, W.

C. N. Bromehead, Merton College, Oxford.

W. J. Kimber, Aldinga, South Australia.

Candidates Proposed for Membership.

William Freeman, Hawkhurst, Milton Road, Oundle.

Samuel Hainsworth, 60, George Street, Saltaire, Yorks.

John Laycock, 30, Herries Street, Ashton-under-Lyne.

William Whitehead, 25, High Street, Stalybridge.

Papers Read.

"*Tapes aureus* and its Allies," by A. J. Jukes Browne.

"*Hydrobia jenkinsi* in Rivers," by the Rev. Canon Horsley.

"*Vivipara contecta* (Millet) m. *sinistrorsum*," and "*Vertigo substriata* (Jeff.) m. *sinistrorsum*," by R. Standen.

Proceedings of the London Branch, by J. E. Cooper.

Exhibits.

By Mr. J. Cosmo Melvill : A few specimens of marine shells from Mochras Island, two miles from Harlech, Merionethshire. This island, composed of sand, and rising a few feet above the neighbouring sand dunes, is almost separated from the mainland by an estuary, exposed at low water. It is much belauded in the guide-books to North Wales as possessing an unsurpassed shell-beach. The Rev. Carleton Greene has furnished to one of these a list of the mollusca found. Certainly rare specimens turn up from time to time, but the casual visitor for but an hour or two may be disappointed, as quantity exceeds quality in the proportion of a thousand to one. *Cythera chione*, *Lutraria elliptica*, *Psammobia vespertina*, *Tellina crassa*, *Acteon tornatilis*, *Cypræa europæa*, *Scalaria communis*, and others, some fifty to sixty species in all, rewarded an afternoon's researches. All the Pelecypoda were dissociated valves. On the rocks in the vicinity the usual littoral species abounded.

By Mr. C. H. Moore : *Vertigo edentula*, *Azeca tridens* and var. *crystallina*, from Ilkley, Yorkshire.

By Mr. William Moss : *Helicarion cingulatus* Melv. and Pons., from South Africa. Mr. Moss distributed specimens amongst the members present.

By Mr. E. J. Elliott : *Helix aspera* Fér., two fine specimens found in a bunch of bananas ; one was dead when discovered, but the other is alive, and feeds upon dandelion leaves. This species is a rather uncommon Jamaican mollusc.

By Mr. F. Taylor : *Zonitoides nitidus*, type and var. *albina*, a very pretty form from Taly-bont Marsh, Conway Valley ; a fine series of *Azeca tridens* var. *crystallina*, also typical and cream-coloured examples from Addingham, Wharfedale, Yorks. Specimens were distributed amongst the members present.

By Mr. A. J. Jukes Browne : A series of *Tapes* from British and Mediterranean localities, to illustrate his paper. The fine series from Cette, France, presented to the Manchester Museum by the Rev. Canon Horsley, was also exhibited.

By Mr. J. Wilfrid Jackson : *Helix hortensis*, *H. nemoralis* varr. *libellula*, *castanea*, *coalita*, and various band forms ; *H. arbustorum* var. *flavescens*, from Deepdale near Buxton.

By Mr. R. Standen : *Vivipara contecta* m. *sinistrorsum* (to illustrate his paper) ; *Acme banatica* Rossm., Hungary, and *A. polita* Hartm., Bavaria ; sinistral *Melantho decisa*, Tennessee, U.S.A. ; *Vivipara hungarica*, males and females, from Budapest (Hazay, "Darbshire" collection, Manchester Museum) ; a fine series of *Strombus pugilis* and var. *alatus* illustrating sexual dimorphism, as described by Mr. H. S. Colton (*Nautilus*, vol. 18, p. 138, 1905).

By Mr. Fred Booth : *Vertigo substriata*, typical and sinistral, from Shipley Glen, Yorks.

A fine series of *Helicigona lapicida* and varieties was shewn as a special exhibit by members present. Mr. E. Collier exhibited very prettily marked type from Corbeyrier, Switzerland, and var. *grisea* Moq.-Tand., La Preste, Pyrenees ; Mr. J. Wilfrid Jackson, a large series from many localities, including several beautiful albino specimens collected some years ago in the Zoological Gardens, Regents Park, by Mr. R. D. Darbshire, and a curious carinate form from Deepdale near Buxton ; Mr. F. Taylor, a cream-coloured variety, and a keelless pyramidal example, bearing a strong resemblance to *H. rufescens* ; also a fine set shewing growth stages, all from Cranham Woods near Gloucester. The series of specimens from the Manchester Museum was also shewn, including the very striking var. *flammulata* Drap. from Catalonia.

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"Beitrag zur Kenntnis der Molluskenfauna des Kaukasus," by BARON ROSEN [list of 63 spp.]. "*Xenophora senegalensis* P. Fischer" [found at Cape Verde Islands, and not *X. mediterranea*, as stated by von Martens], by W. KOBELT. "Ueber einige peruanische Clausilien," by PAUL EH RMANN [*Nenia callangana*, n.sp.]. "Aufforderung zur Anstellung biologischer Beobachtungen," by P. HESSE. "Einige Seltenheiten aus meiner Sammlung," by G. BÜLOW [chiefly *Cardium* spp. ; *Goniiodromus* n.subg. of *Amphidromus*]. "Ein neuer *Amphidromus*" [*A. bülowi*, type of subg. *Goniiodromus*], by H. FRUHSTORFER. "Diagnosen neuer *Murella*-Arten" [*M. lauriensis*, *M. castelluccensis*, Calabria], by W. KOBELT. "Zur Kenntnis der Molluskenfauna von Montenegro," by J. M. PETROK [list of 22 spp.]. "Conchyliologisches aus Tirol," by V. GREDLER [*Planorbis gredleri* in Toblacher See, *Helix austriaca* recorded from Tirol in error]. "Die Conchylien des Löss des mittleren Donautales," by S. CLESSIN [list of 40 spp.].

The Nautilus, vol. 18, no. 12, April, 1905.

"List of Shells from North-western Florida," by B. WALKER. "A new species of *Medionidus*" [*M. simpsonianus*, Calvary, Georgia], by B. WALKER. "A new locality for *Cerion incanum*" [Baker's Haulover, Florida], by C. T. SIMPSON. "Sexual Dimorphism in *Strombus pugilus* Linné," by H. SELLERS COLTON. "A new species of *Somatogyris* [*S. walkerianus*] from South Alabama," by T. H. ALDRICH. "New species of *Lymnaea*" [*L. owascoensis*, Owasco Lake, N.Y. ; *L. bryanti*, Alameda Co., Cal.], by F. C. BAKER. "Glochidia of *Unio* on Fishes," by C. H. CONNER. "Notes on the Genus *Aporema* [preoccupied, *Panacea* suggested] Dall," by W. H. DALL. "Note on *Trichodina* Ancey" [preoccupied, *Petriola* suggested], by W. H. DALL.

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"*Sphaerium pallidum* at Salterhebble," by F. BOOTH.

Annales de la Société Royale Zoologique et Malacologique de Belgique, vol. 38.

"Récolte malacologique de M. Weyers dans le sultanat de Sambas (Bornéo)," by PH. DAUTZENBERG [*Amphidromus weyersi*, *Modiola sambasensis*, nn.spp. figd.]. "La faune des Mollusques fossiles néogènes du périmètre du golfe de Naples," by R. BELLINI. "Le système éocène. L'étage sparnacien et sa faune en Belgique," by O. VAN ERTBORN. "Sur l'évolution des Mollusques," by A. LAMEERE. "La classification des Lamellibranches d'après les branchies," by P. PELSENER. "Les dépôts quaternaires et leurs faunes. Causerie géologico-paléontologique," by O. VAN ERTBORN. "Un gîte de *Rostellaria ampla*," by ED. DELHEID.

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"On the occurrence of two species of *Cryptopla* in the Tertiary Rocks of Victoria," by T. S. HALL [*C. pritchardi*, *C. gatliffi*, nn.spp., figd.].

"Report on a small collection of Helicoids from British New Guinea," by G. K. GUDE (*Proc. Malac. Soc.*, vol. 6, p. 114-116) [*Euplecta pratti* n.sp.].

"The Helicoid Land Shells of Asia: Corrections and Additions," by G. K. GUDE (*J. of Malac.*, vol. 11, p. 93-97) [*Cathaica*, 2 nn.spp.].

"Descriptions of nine New Species of Helicoid Land Shells," by G. K. GUDE (*J. of Malac.*, vol. 12, p. 11-14, pl. 3) [*Sitala*, *Thalassia* 2, *Trochonanina*, *Charopa* 2, *Endodonta*, *Chloritis*, *Plectotropis*].

Mollusca collected at Cette, Herault, S. France, in February, 1905.
—This list of the shells I found at Cette, in February, may help others when there or thereabouts to know what to expect. Mr. J. E. Cooper, the Secretary of the London Branch, has kindly named them for me :—

Anomia ephippium L.
Glycymeris violascens Lam.
Barbatia barbata L.
Mytilus edulis L.
Volsella barbata (L.).
V. adriatica (Lam.).
Modiolaria discors (L.).
Pinna fragilis Penn.
Ostrea edulis L.
Pecten maximus (L.).
P. varius (L.).
P. opercularis (L.).
Lima inflata Chem.
Syndosmya alba (Wood).
S. tenuis (Montagu).
Gastrana fragilis (L.).
Tellina donacina L.
T. tenuis Da Costa.
T. incarnata.
Donax trunculus L.
Mactra stultorum L.
M. glauca Born.
Lutraria elliptica Lam.
Meretrix chione (L.).
Venus verrucosa L.
V. gallina L.
Tapes decussatus (L.).
T. texturatus Lam.
Petricola lithophaga Retz.
Cardium aculeatum L.
C. tuberculatum L.
C. edule L.
C. paucicostatum Sow.
Ensis siliqua (L.).
Macha strigillata L.
Pholas dactylus L.

Barnea candida (L.).
Patella vulgata L.
Haliotis lamellosa Lam.
Gibbula magus (L.).
Calliostoma striatum (L.).
C. granulatum (Born).
C. ziziphinus (L.).
Phasianella pullus (L.).
P. vieuxii Payr.
Bolma rugosa L.
Zippora membranacea (J. Ad.).
Calyptraea chinensis L..
Natica catena (Da Costa).
N. maculata Desh.
N. philippiana Recl.
Cerithium vulgatum Brug.
Bittium reticulatum (Da Costa).
Scala clathrus (L.).
Turritella communis Lam.
Aporrhais pes-pelecani (L.).
Litorium cutaceum (L.).
Cassidaria echinophora (L.).
Olivella mutica Say.
Murex brandaris L.
M. trunculus L.
Ocenebra erinacea (L.).
Latirus lignarius L.
Columbella corniculata Lam.
Nassa reticulata (L.).
N. mutabilis L.
N. corniculum Olivi.
Cyclops neritea L.
Scaphander lignarius (L.).
Haminea hydatis (L.).
Sepia officinalis L.

—[Rev. Canon] J. W. HORSLEY.

(Read before the Society, April 12, 1905).

London Branch.—The first ramble of the present season took place on May 6. A fair number of members visited Plumstead Marshes, under the leadership of Mr. A. S. Poore. The water in one or two of the ditches was found to be very strongly impregnated with iron; this seems to be unfavourable to molluscan life, as these ditches contained very few species, and these few were mostly covered with a thick nodulous deposit; a number of examples of *Limnea peregra* in this condition were obtained.—J. E. COOPER, Hon. Sec. (Read before the Society, May 10th, 1905).

NOTES ON THE WEST CORNWALL DISTRICT.

BY C. E. WRIGHT AND LIONEL E. ADAMS, B.A.

(Read before the Society, April 12, 1905).

THE Land's End is a *terra incognita* to most conchologists, and would well repay careful working at a more suitable time of the year than January when we made our pilgrimage in search of records to further the completion of the census.

With the exception of the serpentine promontory at Lizard Point, separated from the rest of the district by the Helford River, the entire formation alternates between shale and granite, both being unpromising from a conchological point of view. The numerous streams, rushing from high inland sources over rocky beds without weed or moss, seem absolutely destitute of bivalves. Several millers and farmers living on these streams assured us that no mussels or shells of any sort inhabited them. Here and there, however, close to the sea we found a few stunted *Limnæa pereger* and *Ancylus fluviatilis*. Near Falmouth, in a brackish marsh close to Swan Pool, we found a few poor specimens of the following species *Pisidium pusillum*, *P. fontinale*, *Planorbis spirorbis* var. *ecarinata*, *Limnæa pereger* and *L. truncatula*.

We searched the small peninsula of Pendennis several times in vain for *Hygromia revelata*, and also the Porthleven and Helston district which was singularly unproductive of nearly everything except *Helix aspersa*, which flourishes wonderfully all through the Duchy in spite of the poverty of the soil, and some of the *Vitreas*, which so often flourish on formations poor in lime; *V. rogersi* often occurring in colonies. *V. lucida* was widely distributed over the whole district, but required digging out of its winter quarters. In this region the animal of this species is remarkably light coloured, often with merely a faint bluish tinge, a strong contrast to the deep cobalt coloured specimens from Tenby and South Devon.

Hygromia revelata turned up at Nanjizal, about two miles from the Land's End, among grass and moss on the stone walls on the cliff, and we also found it along the wall on the top of the cliff between St. Leven and Porthcurno. Near the latter spot, about half-a-mile inland is the little hamlet called Roskestal, where thirty-four years ago one of us spent the best part of a year in a farm house. Of course we paid a visit there, and while the hospitable people were preparing tea we strolled along the once familiar lane, and there again, close to the house, we came upon *Hyg. revelata* crawling on the moss which partly covered the old stone walls.

Thinking it possible that *Geomalacus* might turn up in this particular corner of the island, we did not allow a slug to pass unexamined, and though we did not come across it, it is just possible that this Lusitanian relic may still linger in some unexplored ravine of this comparatively unworked coast.

One of the commonest species in this district, and indeed in all Cornwall and south-west Devon, is *Hygromia granulata*; its distribution extending all over the shale and on a great part of the granite. The shells of this species were often found to be as soft and collapsible as those of *Hygromia fusca* and *Hyg. revelata*—a perfectly comprehensible state of things on a formation of granite and shale.

The Arions reminded one of Irish and South Welsh specimens; *A. ater* being often strongly banded and *A. hortensis* very brilliantly coloured.

The following species were added to the census list:—

Arion minimus.—One specimen, near Truro.

Vitrea crystallina.—Two specimens at Nanjizal, one being var. *contracta* Westl.

V. nitida.—Falmouth and Penzance.

Hygromia fusca.—Falmouth and neighbourhood; Truro and district.

Vallonia costata.—One specimen, Truro.

Pisidium gassiesianum = (*milius*). — Small stream near Penzance.

P. obtusale.—Brackish marsh by Swan Pool, Falmouth.

Vivipara connecta (Millet) m. **sinistrorsum.** — Instances of sinistrorsity amongst the Viviparidae are extremely rare, and as no occurrence of this 'sport' appears to have been recorded for *V. connecta*, it is interesting to note that in the Manchester Museum collection there is a glass cube case containing a fine adult shell (normal) and five young ones, apparently taken from it, one of them being sinistral, the remainder dextral. This set of shells was formerly in the collection of the late Dr. Alcock, who, as is well known, collected the species in abundance at Southport, in 1864, or thereabouts, often in company with Mr. R. D. Darbishire, to whom he presented this choice group. It is probable that neither ever thought of recording this aberrant specimen, as I can find no mention of its occurrence in such of the Society's records as I have access to, where one would have expected to see it noted.—R. STANDEN (*Read before the Society, May 10th, 1905*).

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FREDERICK PRICE MARRAT.

BY JAMES COSMO MELVILL.

(Read before the Society, September 13, 1905).

DURING the first week of November, 1904, there passed away at his residence in Liverpool, one who might well claim to be the "doyen" of the older race of British naturalists, one who had served his generation well in every way, and notably in furthering the study of the Mollusca. Mr. Frederick P. Marrat had long passed the allotted age of man, and was, at the time of his decease, in his eighty-fifth year. By a melancholy coincidence, his son died almost on the same day, and both were laid to rest simultaneously in Childwall Churchyard.

Mr. Marrat came of a naturalist stock, his father being Mr. William Marrat, of Boston, Lincolnshire; and it was either this gentleman, or his eldest son, who discovered the two rare mosses, *Bryum calophyllum* R. Br. and *B. marratii* Hooker f. and Wilson, in damp hollows amongst the sandhills on the Lancashire coast, near Southport, in 1854.¹ Both are still hardly known outside the original habitat.

Mineralogy, and especially the study of Marine Mollusca, most attracted the subject of our notice from the first, although he did not neglect other branches of natural science; and this interest, aided by a wonderfully clear and accurate memory, coupled with a love of

¹ c.f., Wilson, "Bry. Brit.," addenda, p. xi., where the discoverer is alluded to as "Mr. W. M. Marrat, of Liverpool."

scientific detail, was ardently sustained till the very end of his life. He became associated with the Liverpool Museum more than forty years ago, about 1863, and in conjunction with Mr. T. J. Moore, the then able curator, and the Rev. Henry H. Higgins, for long a household word in Liverpool scientific circles, aided in the arrangement of the large natural history collections being amassed there.

Towards the elucidation of the Mollusca, he contributed an able monograph of the genus *Oliva* to Sowerby's "Thesaurus Conchyliorum," 1870-1871. In this he proposed many critical species, the majority of which are duly recognized at the present day. Subsequently, his ideas as to specific characters underwent a process of much modification and change, as evidenced especially in the genus *Nassa*, on which he wrote two or three treatises¹; in one, proposing many new species, while in another he published phylogenetic tables, endeavouring to prove the exceeding proneness to vary in all the forms, and ultimately concluding that they *all* were descended from a common ancestor, probably *N. glans* L. No one character, either as regarded form, colour, size, marking or sculpture, seemed to him otherwise than elusive to an extraordinary extent; but, in our opinion, his conclusions are too drastic, and we have been unable to detect the intermediate links in such overwhelming numbers as to reduce the species of the genus to an infinitesimal minimum. I recollect, also, his once telling me that he considered *Cypræa aurantium* probably to be only a large deep-sea form of *C. mappa*. But this, I think, was also rather a far-fetched conclusion.

I have been acquainted with Mr. Marrat since 1868-69, when I resided in Liverpool for two years, and have always much admired and appreciated his love of accurate detail, his great acumen, unvarying good nature and common-sense.

It was he who, in 1865, catalogued the famous collection formed by the late Mr. John Dennison, of Liverpool, which was sold at Stevens' Auction Rooms, on April 24 and five subsequent days, this being still considered the most distinguished collection of shells that has come under the hammer during the last half-century, the specimens realising in many cases remarkable and record prices. A large number of these found their way to the Liverpool Museum, being specimens as a rule unsurpassed for fineness of condition, either through the instrumentality of the Rev. H. H. Higgins, Mr. Samuel Smith, late manager of the Bank of Liverpool and a well-known private collector, or Mr. Marrat himself.

¹ "On the Variation of Sculpture in the Genus *Nassa*"; Liverpool, May, 1876. "On Forty Proposed New Forms in the Genus *Nassa*"; Liverpool, 1877. "On the Varieties of the Shells of the Genus *Nassa* Lam."; Liverpool, 1880.

I shall personally always feel much indebted to him for having kindly volunteered to name and classify the whole of my collections of the three genera he especially affected: *Nassa*, *Oliva*, and *Marginella*, thus adding much to the intrinsic educational value of the series.

Amongst the many subjects treated of in the scientific papers contributed by Marrat, the following seem especially deserving of passing notice at the present juncture:—

(a).—The fine *Rostellaria martinii*, described as *Gladius martinii*,¹ was the most important shell to which he stood godfather. Of this two specimens were obtained by the late Mr. Sidney Trice Martin, from Cebu, Philippine Islands, one of which (the type) is in the Liverpool Museum; the other now in my collection; while a third has been recently acquired by the British Museum (Nat. Hist.).

(b).—In the genus *Marginella* several species were described by him, mostly from the collection of Mr. Keen,² of Liverpool.

(c).—Mollusca from the west coast of Africa, likewise, were of special interest to him, as evidenced by a paper from his pen, describing several forms of Marginellidæ and Pleurotomidæ, many collected by Captain Cawne Warren, or in the “Keen” collection.³

(d).—And, finally, *Eulima candida* Marrat⁴ is the noblest species of that interesting genus. It is now ascertained to come from the Island of Formosa.

1 *Journ. of Conch.*, vol. 1, p. 244, with plate, 1877.

2 *Journ. of Conch.*, vol. 1, pp. 136, 179, 204, 1876-77.

3 *Journ. of Conch.*, vol. 1, p. 381, 1878.

4 *Proc. Liverpool Phil. Soc.*, p. 339, 1880.

Note on *Crepidula fornicata* L.—*Crepidula fornicata* L. the “crow-oyster,” originally introduced with American oysters, has been found in several of the rivers of Essex for eleven years or more. It would appear that the conditions in the Crouch river are particularly favourable to it, as it is fast becoming a nuisance to the oyster-men at Burnham-on-Crouch. In some parts of this river nearly every pebble and old shell has one or more (generally more) specimens on it. Clusters of five or six, one on the back of the other are common; one group found this year had no less than nine in this position. Some pebbles carry a cluster on both sides; even the neck of a broken bottle gave foothold to two inside and three outside. The lowest shell of a group is obliged to adapt its form to the pebble or shell to which it is attached, consequently some curious forms occur. Where the base is an old oyster the bottom *Crepidula* is remarkably flattened; but whatever the shape of the lowest may be, those above it are usually normal in form.—J. E. COOPER (*Read before the Society*, September 13th, 1905).

REVERSED SHELLS IN THE MANCHESTER MUSEUM.

By R. STANDEN.

(Read before the Society, September 13th, 1905).

THE Rev. G. A. Frank Knight, in an interesting discourse delivered to the Perthshire Society of Natural Science, on "Sinistrorsity in the Mollusca," observed that there exists no list of the Mollusca in which the phenomenon of reversal of the shell-spire is known to occur. Although the compilation of such a catalogue would be beyond the powers of a single conchologist, it appeared that the work might be accomplished by co-operation, and as a first instalment I venture to offer the following list of reversed specimens contained in the Manchester Museum. Perhaps its publication may incite other curators to contribute information on the same topic from the collections under their charge, and thus by degrees the list will approach completeness.

By way of introduction to the subject, I quote, with Mr. Knight's permission, a few paragraphs from his lecture, explanatory of the subject of "Sinistrorsity," or reversal of the shell, which I find the majority of persons have a difficulty in understanding:—

"A univalve spiral shell is said to be 'dextral' when the mouth opens to the *right* hand of the observer, as he holds it with the spire pointing upwards. A univalve spiral shell is said to be 'sinistral' when the aperture is to the *left* hand of the observer, as he holds the shell with its apex upwards. If we imagine the interior of the shell to be a spiral staircase, then, as we ascend a *dextral* mollusc, the 'axis' or 'columella' of the stair would always be at our left hand, and similarly, if the mollusc be *sinistral*, the stair up into its interior would always curve round the axis on the right hand.

"The whole subject of convolution in the mollusca is one of extreme interest, and has excited the enquiries of eminent scientists. As far back as 1838, we find the Rev. Canon Moseley contributing an elaborate essay 'On the Geometrical Form of Turbinated and Discoid Shells,' which was published in the *Philosophical Transactions* for that year. In this paper he proves that the laws which determine even such an apparently insignificant matter as the mode in which the shells of univalves are spirally twisted, are as mathematically true as the conic sections which regulate the orbits of the planets and comets! He shows that the size of the whorls, and the distance between contiguous whorls, in such shells as the common *Turritella* of our shores or *Planorbis* of our ponds, follow a geometrical progression. The spiral formed is the "logarithmic," of which it is a property that it has everywhere the same geometrical curvature, and is the only curve, except the circle, which possesses this property.

Obeying this law the mollusc winds its dwelling in a uniform direction through the space around its axis.

"Now it will be readily understood that, as the mantle of the mollusc secretes the shelly integument, there is before the animal an almost infinite choice as to the way in which it will build up its home. So long as the form of the shell is regular, following out the principle of a cone curved into a spiral, and descending in a screw-like manner from the apex (or initial whorl) to the aperture, the animal may select almost any variety of convolution. If uninterfered with by any foreign obstruction, the animal, with unerring certainty, will mould for itself a habitation, which, as I said, will be finished with an absolutely perfect devotion to geometrical curves, proportion, and principles. It is therefore a fascinating study to observe how infinitely varied the series of curves may be, and how wide is the scope granted to every mollusc in the erection of its home, the only condition being that, in the case of the "regularly spiral" shells, the law of 'the spire of the logarithm' must be strictly adhered to.

"We observe then that, as the result of the inequality of growth in the mantle and shell, there arise spiral twistings, and these eventually produce an almost infinite diversity of curve. A series of torsional convolutions may be traced, for example, from the long, many-whorled *Terebra*, to the broad, flat, depressed *Haliotis*, and from that again right on to *Patella*. Or again the regularly built-up *Turritella* may be pulled out into the fantastic contortions of *Vermetus*, and the unrolling may be carried so far that the whorls are all straightened out into a single tube like *Dentalium*. Once more, when a shell such as *Cypræa* or *Conus* is examined, it is seen that the body of it is made up simply of the last whorl, with the ghosts, so to speak, of its predecessors visible in small detail on what was once an elongated spire. But whether the spiral convolutions are visible in the adult stage, or only in the embryonic condition of the shell, the fact remains that the twist has exercised an important function in the life history of the mollusca. Prof. Sydney J. Hickson¹ cites with approval Lang's generalization on this subject.² 'The formation of a spire-like shell, which has been recognised as the starting point in the development of the asymmetry of reptant Gastropods, was the only method by which complete protection of the whole body could be attained, and must therefore be considered to have been advantageous under the circumstances.'

"Now all molluscs with spiral shells must, naturally, twist either to the right or to the left. And as a matter of fact, the vast majority of

¹ "Torsion in Mollusca," *Journal of Conchology*, vol. 9, pp. 9-15, 1898.

² "Text-book of Comparative Anatomy," vol. 2, p. 150.

gastropods have dextral shells, it being the exception to find shells built up with a left-handed twist.

"But there is a subject to be investigated in connection with sinistral molluscs more intricate than that which merely concerns the reversed whorl of the external shell. The further question arises, Is the internal animal, with its various organs, also reversed? Is there a strict correspondence between the shelly integument and the mollusc, so that, if the outside spiral is sinistral, the soft inside parts are also sinistrally placed? Now the answer here is very varied.

"First, in all cases where sinistrorsity occurs as an abnormal feature (*i.e.*, where the type is usually dextral, and a left-handed individual is simply 'a freak'), this correspondence is maintained. The internal organs in these instances are all 'reversed' too, the viscera being transposed in their relative positions. Second, in all examined cases when the shell is as often dextral as sinistral, *i.e.*, where it does not seem that we can decide which is the really typical form as to the direction of the whorl, the same rule obtains—the position of the internal organs agrees with the shell. If the shell is sinistral, the organs are sinistral; if dextral, the soft parts are dextrally arranged too. But in the case of genera which are normally sinistral, the same law does not hold. Among molluscs also, whose genus is normally dextral, but certain species of which are normally sinistral, the strangest variations occur. A shell twisted to the left may have the body of the animal twisted to the right, and *vice-versâ*. In *Limacina*, *Meladomus*, and *Lanistes*, for example, the calcareous integument is sinistral, while the animal is dextral.¹ What are we to make of this? How comes it that the internal animal, dwelling in a house built on a left-handed spiral, has all its visceral organs arranged as if they were designed to fit into a domicile reared on the principle of a right-handed spiral? The problem, which long seemed insoluble, has recently been carefully investigated, and most ingeniously explained, through the researches of Simroth, of von Ihering, and especially of Pelseneer.

"Briefly, the theory which these scientists have advanced is that of 'hyperstrophy' or 'over-turning,' and it amounts to this, that these abnormalities and discordances between shell and animal are the result, not of sinistrorsity, but of ultra-dextrality. Let us imagine a *Physa*-shaped shell, with a spire normally sinistral, and an internal animal also sinistral. Its spire is elongated, and it presents a comparatively tapering appearance. Let us now suppose that this elongated spire is so depressed and pushed into the body of the shell that it projects very little above the level of the series of whorls. That would be a second stage towards complete inversion of the

1 Rev. A. H. Cooke, "Molluscs and Brachiopods," Cambridge Nat. Hist., p. 249.

visceral organs. Depress the remainder of the spire still more, and now the apex is flush with the rest of the whorls, and lies flat like the spring of a watch. The *Physa*-like shell has become a *Planorbis*-shaped shell! But now continue the depression of the apex, push it right through to the other side, and the discoid or planorboid shape gives place to an intermediate sub-discoidal form. Continue the process still further, and you have your *Physa*-like shell back again, but now with the whorls completely reversed! The sinistral shell, with its sinistrally placed viscera, first of all passed into what might be called a neutral stage, wherein it was hard to say whether its planorboid shape meant that it was sinistral or that it was dextral; and from that it emerged into a pseudo-dextral, but really ultra-sinistral shell, but with its viscera still sinistral! Thus it would appear that the planorboid shape is really a kind of intermediate, half-way house between, on the one hand, sinistrorsity of both shell and animal, and, on the other hand, sinistrorsity of animal, but pseudo-dextrality of shell. Naturalists of an earlier day, such as Lamarck and Deshayes, puzzled with the apparent anomalousness of these phenomena, named the genus *Planorbis* 'amphidromic,' or 'turning in both directions,' as certain species seemed to choose one course and certain others a reverse direction. But this ingenious theory of 'hyperstrophy,' or the turning of a mollusc inside out like the finger of a glove, entirely explains what before was so obscure.¹

"This process of turning inside out may take place in either direction; in other words, there may be ultra-sinistrorsity or ultra-dextrality. The former may be illustrated in the case of two fresh-water genera, *Pompholyx* from North America, and *Choanophthalmus* from Lake Baikal; and the latter by the genera already cited—*Limacina*, *Meladomus*, and *Lanistes*."

It may perhaps be added that the subjoined catalogue is a list, not of published records, but of actual specimens.

NORMALLY SINISTRAL SPECIES.

<i>Plectopylis plectostoma</i> Bens.		<i>Helix quærita</i> Desh.	Japan.
	Khasi Hills, India.	<i>H. filippina</i> Heude.	China.
<i>Ariophanta cambogiensis</i> Rze.		<i>H. subsimilis</i> Desh.	China.
	Cambodia.	<i>H. cicatricosa</i> Müll.	China.
<i>A. brookei</i> Bens.	Borneo.	<i>Orthalicus regina</i> Fér.	Amazons.
<i>A. foveata</i> Pfr.	India.	<i>Columna flammea</i> Martyn.	
<i>A. rumphii</i> Gr.	Java.		Prince Edward's Island.
<i>A. janus</i> Bk.	Malacca.	<i>Partula canalis</i> Mouss.	Samoa.
<i>A. levipes</i> Müll.	Bombay.	<i>P. rubescens</i> Rze.	Upolu.
<i>A. thyreus</i> Bens.	Nilghiri Hills, India.	<i>P. amabilis</i> Pfr.	Marquesas Islands.
<i>A. regalis</i> Bens.	Borneo.	<i>Amphidromus sinensis</i> Bens.	Pegu.
<i>A. bajadera</i> Pfr.	Bengal.	<i>A. porcellanus</i> Mouss.	Java.

¹ Admirably illustrated by diagrams in J. W. Taylor's *Monog. of the Brit. L. and F. M.* Moll., vol. 1, pp. 111, 112.

- Amphidromus lævis* Müll. Borneo.
A. furcillatus Mouss. Borneo.
A. adamsi Rve. Borneo.
A. quadrasi Hidalgo. Balabac Island.
A. sinistralis Rve. Java.
Achatina bicarinata Lam. West Africa.
Buliminus tournefortianus Fér. Rhodes.
B. tauricus Lang. Crimea.
B. thiesseana Mouss. Greece.
B. spoliatus Parr. Eleusis, Greece.
B. domina Bens. Murree, India.
B. quadridens Müll. Alps.
B. candelaris Pfr. Tibet.
B. reversalis Blz. Transylvania.
B. vibex Hutt. India.
Draparnaudia lifuana Pilsbry. Lifu.
D. singularis Pfr. New Hebrides.
Pupa capensis Kurr. Nord Hoek, S. Africa.
P. kurri Krauss. Baas Dorp, S. Africa.
P. kraussi Mts. Nord Hoek, S. Africa.
P. fabricana Crosse. N. Caledonia.
P. magdalena Ancey. Edithburgh.
P. australis Ad. & Ang. Port Elizabeth, S. Africa.
P. ponsonbyana M. & S. Port Elizabeth, S. Africa.
Vertigo sinistrorsa Crawford. Algoa Bay, S. Africa.
V. angustior Jeff. Ireland.
V. pusilla Müll. Britain.
Diplommatina huttoni Pfr. Trinidad.
D. montrouzieri Crosse. N. Caledonia.
D. morongensis Mllbrff. Philippines.
Palaina quadrasi Mllbrff. Manila.
Opisthostoma mirabile Smith. North Borneo.
O. decrespignyi Adams. Borneo.
Cylindrella agnesiana C. B. Ads. Jamaica.
C. gracilis Wood. Jamaica.
C. elongata Chem. Jamaica.
Pleurotoma perversa Gabb. California.
Fulgur perversum L. N. America.
Neptunea harpa Mörch. Sitka.
Pyrula citrina Lam. Red Sea.
Trifora carinatus Montr. Lifu.
T. perversus L. Herm.
T. corrugatus Hinds. Torres Straits.
T. collaris Hinds. Lifu.
T. tristoma Blainv. Lifu.
T. connatus Montr. Lifu.
T. hindsii Desh. Lifu.
T. sculptus Hinds. Lifu.
T. violaceus Quoy. Lifu.
T. carteretensis Hinds. Lifu.
T. cinguliferus Pease. Lifu.
T. hilaris Hinds. Lifu.
T. obtusalis Jous. Lifu.
T. ruber Hinds. Lifu.
T. acutus Kien. Karachi.
T. idoneus M. & S. Karachi.
Limacina bulimoides D'Orb. Britain.
L. retroversa Flem. Britain.
Limnæa compacta Pease. Maui, Sandwich Islands.
L. oahuensis Soul. Oahu, Sandwich Islands.
L. swinhoei H. Ads. Formosa.
Physa achaïæ West. Greece.
P. berendti Dkr. Yucatan.
P. brazieri Smith. N. S. Wales.
P. diemenensis Sow. Tasmania.
P. diaphana Tryon. Nevada.
P. inflata Ad. & Ang. West Victoria.
P. pomelia Con. U. S. America.
P. integra Hald. U. S. America.
P. mamillata Sow. Jamaica.
P. scalaris Jacq. Florida.
P. incisa Gassies. Lifu.
P. elata Gld. Mazatlan.
P. nivalis Sow. Chile.
P. tetrica Morel. Java.
P. rivalis M. & R. Trinidad.
P. elliptica Lea. U. S. America.
P. martonelli Bourg. Spain.
P. cernica L. Mauritius.
P. jamaicensis Ads. Jamaica.
P. cubensis Pfr. Cuba.
P. gabbi Tryon. Oregon, U.S.A.
P. guadaloupensis Fischer. Guadeloupe.
P. multistriata Tate. S. Australia.
P. teneriffæ Mss. Teneriffe.
P. tasmanica Pet. Tasmania.
P. nitens Phil. Yucatan.
P. canescens Morl. W. Africa.
P. aurantia Carp. Guatemala.
P. tenuistriata Sow. Australia.
P. madagascarensis Morl. Madagascar.
P. spiculata Mart. Mexico.
P. schmidtii Dunk. Kailak.
P. tropica Krauss. Cape Town.
P. panamensis Küster. Quito.
P. badia Ad. & Ang. Arnheim.
P. proteus Sow. Rockhampton, Queensland.
P. newcombi Ad. & Ang. Mount Margaret, C.A.
P. reevei Ad. & Ang. N. Australia.
P. guilaini Cr. & Marie. N. Caledonia.
P. lessoni Smith. Marrabre.
P. tongana Quoy. N. Holland.
P. maugeere Quoy. Guatemala.
P. castanea Lam. N. Caledonia.
P. caledonica Morl. Maie, N. Caledonia.
P. obtusa Pfr. N. Caledonia.
P. fumosa Pet. Tasmania.
P. nasuta Lam. Yahone.
P. doliolum Gas. Moiridon.
P. novæhollandiæ Blainv. S. Australia.
P. gibbosa Gcd. Paramatta River, N. S. Wales.
P. perlucida Gass. Island of Pines, N. Caledonia.

<i>Physa auriculata</i> Gass.	N. Caledonia.	<i>Cl. bizantina</i> Charp.	Crete.
<i>P. acuta</i> Drap.	Ostend.	<i>Cl. blanda</i> Zgl.	Dalmatia.
<i>P. frosheyi</i> Lea.	Texas.	<i>Cl. arcadica</i> Btbg.	Arcadia.
<i>P. pumila</i> Lea.	Florida.	<i>Cl. bogatensis</i> Bielz.	Transylvania.
<i>P. fontinalis</i> L.	Europe.	<i>Cl. bohemica</i> Cless.	Bohemia.
<i>P. niagarensis</i> Lea.	Niagara Falls, U.S.A.	<i>Cl. boissieri</i> Charp.	Nahr el Kelb.
<i>P. hypnorum</i> L.	U. S. America.	<i>Cl. tau</i> Btg.	Hunan, China.
<i>P. heterostrophia</i> Say.	U. S. America.	<i>Cl. bosniensis</i> Zgl.	Croatia.
<i>P. gyrina</i> Say.	U. S. America.	<i>Cl. brevicollis</i> Pfr.	Rhodes.
<i>P. aurea</i> Lea.	U. S. America.	<i>Cl. buschi</i> Kust.	Japan.
<i>P. hildrethi</i> Nutt.	U. S. America.	<i>Cl. cana</i> Held.	Galicia.
<i>P. politissima</i> Tryon.	U. S. America.	<i>Cl. cærulea</i> Fér.	Santorin.
<i>P. warreniana</i> Lam.	U. S. America.	<i>Cl. canaliculata</i> Pfr.	Mt. Delphi.
<i>P. ancillaria</i> Say.	U. S. America.	<i>Cl. candidescens</i> Zgl.	Campana.
<i>P. halei</i> Lea.	Texas.	<i>Cl. cattaroensis</i> Rsm.	Cattaro.
<i>P. occidentalis</i> Tryon.	California.	<i>Cl. canescens</i> Parr.	Hungary.
<i>P. pyramidata</i> Sow.	Australia.	<i>Cl. catalonica</i> Fag.	Barcelona.
<i>P. dombei</i> Rossiter.	Dombeya.	<i>Cl. cecillei</i> Phil.	China.
<i>P. purpurastoma</i> Trist.	Guatemala.	<i>Cl. cincta</i> Born.	China.
<i>Physopsis africana</i> Krauss.	Natal, S. Africa.	<i>Cl. cinerea</i> Phil.	Sicily.
<i>P. angolensis</i> Morl.	Angola.	<i>Cl. clandestina</i> Rve.	Pelim.
<i>P. nyassensis</i> Smith.	Lake Nyassa.	<i>Cl. coarctata</i> Mouss.	Phthiolis.
<i>Isidora raymondiana</i> Brgt.	Algiers.	<i>Cl. commutata</i> Rve.	Carinthia.
<i>Camptoceras terebra</i> Bens.	Moradabad, India.	<i>Cl. compressa</i> Pfr.	Cenigo.
<i>Lanistes solidus</i> Smith.	Lake Nyassa.	<i>Cl. concilians</i> O. Schum.	Hungary.
<i>L. nyassanus</i> Dohrn.	Lake Nyassa.	<i>Cl. conemensa</i> Btbg.	Patrasso.
<i>L. bolteniana</i> Chem.	River Nile.	<i>Cl. confinata</i> Bens.	Sicily.
<i>L. intorta</i> Lam.	Gambia.	<i>Cl. confusa</i> Btbg.	Cerigo.
<i>L. olivacea</i> Sow.	Zanzibar.	<i>Cl. conspurcata</i> Jan.	Dalmatia.
<i>L. lybicus</i> Morl.	Cape Coast Castle.	<i>Cl. corcyrensis</i> Mouss.	Corfu.
<i>L. ovum</i> Peters.	Mozambique.	<i>Cl. corrugata</i> Drap.	Crete.
<i>L. purpurea</i> Jon.	Zanzibar.	<i>Cl. corticina</i> V. de B.	Java.
<i>Clausilia abietina</i> Dupuy.	Catalonia.	<i>Cl. corynodes</i> Held.	Switzerland.
<i>Cl. achaica</i> Btbg.	Greece.	<i>Cl. crassilabris</i> Küst.	Issa.
<i>Cl. aculus</i> Bens.	China.	<i>Cl. crenulata</i> Phil.	Alps.
<i>Cl. affine</i> Rossm.	La Praste, Pyrenees.	<i>Cl. crispa</i> Lowe.	Madeira.
<i>Cl. agesilaus</i> v. Mart.	Mt. Taygetws, Greece.	<i>Cl. cristatella</i> Kust.	Greece.
<i>Cl. albocincta</i> Pfr.	Spalato.	<i>Cl. cruciata</i> Sh.	Switzerland.
<i>Cl. alboguttulata</i> Wagn.	Milan.	<i>Cl. cuningiana</i> Pfr.	Philippines.
<i>Cl. albopustulata</i> Fér.	Switzerland.	<i>Cl. curta</i> Rsm.	Trieste.
<i>Cl. almissana</i> Küst.	Almissa.	<i>Cl. cushmanii</i> Kust.	Dalmatia.
<i>Cl. altritria</i> Btbg.	Hakone, Japan.	<i>Cl. cylindrica</i> Gray.	Simla.
<i>Cl. amorgia</i> Btbg.	Island of Amorgos, Greece.	<i>Cl. dacia</i> Friv.	S. Hungary.
<i>Cl. aquila</i> Parr.	Greece.	<i>Cl. dalmatina</i> Partsch.	S. Hungary.
<i>Cl. armata</i> Küst.	Dalmatia.	<i>Cl. decipiens</i> Rsm.	Dalmatia.
<i>Cl. artifina</i> Heude.	China.	<i>Cl. deltostoma</i> Lowe.	Madeira.
<i>Cl. aurantiaca</i> Btbg.	Japan.	<i>Cl. derasa</i> Mouss.	Transcaucasia.
<i>Cl. bassiana</i> Bielz.	Transylvania.	<i>Cl. discolor</i> Pfr.	Seripos.
<i>Cl. beboudii</i> Dup.	St. Marcellina.	<i>Cl. dubia</i> Drp.	Carpathian Mountains.
<i>Cl. beucadia</i> Btg.	St. Maura.	<i>Cl. elata</i> Zgl.	Hungary.
<i>Cl. biasoletiana</i> Charp.	Trieste.	<i>Cl. elegans</i> Bielz.	Valachie.
<i>Cl. bicristata</i> Friv.	Mt. Delphi.	<i>Cl. elizabethæ</i> Möll.	Canton.
<i>Cl. bidentata</i> Strom.	Styria.	<i>Cl. epirotica</i> Mouss.	Prevesa.
<i>Cl. bidens</i> L.	Italy.	<i>Cl. epistomium</i> Kust.	Columbia.
<i>Cl. bigibbosa</i> Charp.	Asia Minor.	<i>Cl. exarata</i> Zgl.	Dalmatia.
<i>Cl. bilabiata</i> Smith.	Nippon.	<i>Cl. fallax</i> Rossm.	Europe.
<i>Cl. bilabiata</i> Wagn.	Caltoro.	<i>Cl. fargesiana</i> Heude.	Europe.
<i>Cl. biplicata</i> Mont.	England.	<i>Cl. filograna</i> Zgl.	Interlaken.
<i>Cl. birugosa</i> Parr.	Santorin.	<i>Cl. fimbriata</i> Alf.	Croatia.
		<i>Cl. foveicollis</i> Parr.	Kachetia.
		<i>Cl. fragites</i> Drap.	Europe.
		<i>Cl. freyi</i> Rav. & Dautz.	Tonkin.
		<i>Cl. fulcrata</i> Zgl.	Spalato.

<i>Clausilia furcilla West.</i>	Patros.	<i>Cl. orthostoma Menke.</i>	Hungary.
<i>Cl. genezarethana Trist.</i>	Galilee.	<i>Cl. pachygastris Bk.</i>	Zürich.
<i>Cl. gibbula Rossm.</i>	Treiste.	<i>Cl. peestana Phil.</i>	Italy.
<i>Cl. gigas Molládrff.</i>	China.	<i>Cl. pagana Zgl.</i>	Hungary.
<i>Cl. glauca Bielz.</i>	Transylvania.	<i>Cl. papillaris Pfr.</i>	Trieste.
<i>Cl. gracilicostata Zgl.</i>	Sevastopol.	<i>Cl. parvula Stud.</i>	Switzerland.
<i>Cl. gracilis Ris.</i>	Switzerland.	<i>Cl. pauli Mat.</i>	Pyrenees.
<i>Cl. grayana Pfr.</i>	Nauplia.	<i>Cl. penchinati Bgt.</i>	Barcelona.
<i>Cl. grimmeri Parr.</i>	Austria.	<i>Cl. perversa L.</i>	Britain.
<i>Cl. grisea Desh.</i>	Greece.	<i>Cl. pfeifferi Küst.</i>	Dalmatia.
<i>Cl. homalorapha Pfr.</i>	Candia.	<i>Cl. philippiana Pfr.</i>	Philippines.
<i>Cl. imitatrix Bttg.</i>	Malta.	<i>Cl. phyllostoma</i>	China.
<i>Cl. incommoda Bttg.</i>	Malta.	<i>Cl. platydera Mts.</i>	Japan.
<i>Cl. invalida Mouss.</i>	Corfu.	<i>Cl. plicata Drap.</i>	Budapest.
<i>Cl. irregularis Zgl.</i>		<i>Cl. plicatula A. Schum.</i>	Hungary.
<i>Cl. isabellina Pfr.</i>	Ægina.	<i>Cl. plumbea A. Schum.</i>	Hungary.
<i>Cl. istriana A. Schum.</i>	Istria.	<i>Cl. porphyrea Mlldff.</i>	Macao.
<i>Cl. itala v. Mart.</i>	S. Tyrol.	<i>Cl. profuga Charp.</i>	Argos.
<i>Cl. javana Pfr.</i>	Java.	<i>Cl. pseudosyracusana Galts.</i>	Malta.
<i>Cl. josephinae Btg.</i>	Athens.	<i>Cl. pulverosa L.</i>	Switzerland.
<i>Cl. kobensis Smith.</i>	Athens.	<i>Cl. punctata Mich.</i>	France.
<i>Cl. kruperi Pfr.</i>	Psari.	<i>Cl. punctulata Kust.</i>	Dalmatia.
<i>Cl. kuesteri Rsm.</i>	Corsica.	<i>Cl. purpurascens Midd.</i>	Pisano.
<i>Cl. kutschigi Küst.</i>	Dalmatia.	<i>Cl. pyrenaica Brgt.</i>	Pyrenees.
<i>Cl. labiata Mont.</i>	France.	<i>Cl. regalis Bielz.</i>	Kronstadt.
<i>Cl. lævissima Zgl.</i>	Dalmatia.	<i>Cl. rolphi Leach.</i>	England.
<i>Cl. lamellosa Wagn.</i>	Dalmatia.	<i>Cl. rossmassleri Pfr.</i>	Carinthia.
<i>Cl. laminata Mont.</i>	Marple, Cheshire.	<i>Cl. rugicollis Zgl.</i>	Krassove.
<i>Cl. lampedusæ</i>	S. Europe.	<i>Cl. satura Zgl.</i>	Herzegovina.
<i>Cl. latestriata Bielz.</i>	Hungary.	<i>Cl. saxicola Rossm.</i>	Athens.
<i>Cl. leucoraphe Blom.</i>	Greece.	<i>Cl. sejuncta West.</i>	Sweden.
<i>Cl. leucostigma Zgl.</i>	Italy.	<i>Cl. semirugata Zgl.</i>	Dalmatia.
<i>Cl. lineolata Zgl.</i>	Bavaria.	<i>Cl. septemPLICATA Phil.</i>	Palermo.
<i>Cl. litotes Parr.</i>	Caucasus.	<i>Cl. similis Charp.</i>	Switzerland.
<i>Cl. loczyi Bttg.</i>	China.	<i>Cl. solida Drap.</i>	Provence.
<i>Cl. lorrani Alke.</i>	Hong Kong.	<i>Cl. solidula Drap.</i>	Nice.
<i>Cl. lunellaris Pfr.</i>	Eubœa.	<i>Cl. stentzii A. Schm.</i>	Dolomite Mts.
<i>Cl. macarana Zgl.</i>	Dalmatia.	<i>Cl. stolachi Class.</i>	
<i>Cl. macrostoma Kust.</i>	Malta.	<i>Cl. byzantina Charp.</i>	Crete.
<i>Cl. maculosa Desh.</i>	Attica.	<i>Cl. straminicollis Parr.</i>	Hungary.
<i>Cl. madensis Farr.</i>	Hungary.	<i>Cl. strangulata Fér.</i>	Lebuan.
<i>Cl. magistra Sow.</i>		<i>Cl. striata Pfr.</i>	Crete.
<i>Cl. marisi Sch.</i>	Transylvania.	<i>Cl. strobili Porro.</i>	Como.
<i>Cl. maritima Kl.</i>	Patras.	<i>Cl. styriaca Schm.</i>	Styria.
<i>Cl. messengeri Bavay & Dautz.</i>	Tonkin.	<i>Cl. sublamellosa Bttg.</i>	Crete.
<i>Cl. messenica Mart.</i>	Messina.	<i>Cl. subvirginea Bttg.</i>	Crete.
<i>Cl. milleri Pfr.</i>	Zaros.	<i>Cl. sulcosa Wagn.</i>	Gravosa.
<i>Cl. moesta Fer.</i>	Sarepta.	<i>Cl. swinhoei Pfr.</i>	Formosa.
<i>Cl. mouhoti Pfr.</i>	Laos.	<i>Cl. syracusana Phil.</i>	Sicily.
<i>Cl. monizeana Lowe.</i>	Lisbon.	<i>Cl. taczonowskii Lud.</i>	Peru.
<i>Cl. moussoni Charp.</i>	Switzerland.	<i>Cl. teres Oliv.</i>	Crete.
<i>Cl. montana Bttg.</i>	Moldavia.	<i>Cl. tetragonostoma Pfr.</i>	Enbœa.
<i>Cl. montenegrina Küst.</i>	Celtinge.	<i>Cl. theissæ Bttg.</i>	Patras.
<i>Cl. mucida Zgl.</i>	Carniola.	<i>Cl. timorensis Mss.</i>	Island of Timor.
<i>Cl. munda Rsm.</i>	Smyrna.	<i>Cl. tidrens Ch.</i>	Porto Rico.
<i>Cl. nevosa Zgl.</i>	Cephalonia.	<i>Cl. tristrami Pfr.</i>	Tunis.
<i>Cl. negropontina Pfr.</i>	Eretria.	<i>Cl. turgida Zgl.</i>	Moravia.
<i>Cl. nigra Lowe.</i>	Madeira.	<i>Cl. turrita Pfr.</i>	Candia.
<i>Cl. nigricans Tapf.</i>	Bayonne.	<i>Cl. unguolata Zgl.</i>	Syria.
<i>Cl. obtusa C. Pfr.</i>	Europe.	<i>Cl. valida Pfr.</i>	Loo Choo Islands.
<i>Cl. olivieri Roth.</i>	Europe.	<i>Cl. varians Zgl.</i>	Tyrol.
<i>Cl. opalina Zgl.</i>	Italy.	<i>Cl. vasta Bttg.</i>	Nagasaki.
<i>Cl. ornata Rossm.</i>	Croatia.	<i>Cl. ventricosa Drap.</i>	France.

<i>Cl. venusta</i> Sch.	Greece.	<i>Cl. vulcanica</i> Bens.	Corsica.
<i>Cl. vetusta</i> Zgl.	Styria.	<i>Cl. waageni</i> Stal.	Himalaya.
<i>Cl. villae</i> Mlf.	Lombardy.	<i>Cl. waldendorffi</i> Parr.	Dalmatia.
<i>Cl. virgata</i> Jan.	Minorca.	<i>Cl. yokohamensis</i> Cr.	Japan.

ABNORMALLY SINISTRAL.

Of rare occurrence.

<i>Gibbus lyonetianus</i> Pallas.	Mauritius.	<i>Limnæa peregra</i> L.	Tooting, Surrey.
<i>Helix pomatia</i> L.	France.	<i>Planorbis spirorbis</i> L.	Tenby.
<i>H. aspersa</i> Müll.	France.	<i>Melantho decisa</i> Say.	Tennessee.
<i>H. nemoralis</i> L.	Bundoran, Ireland.	<i>Buccinum undatum</i> L.	Isle of Thanet.
<i>H. hortensis</i> Müll.	Devonshire.	<i>Neptunea antiqua</i> L.	Scotland.
<i>H. arbustorum</i> L.	Derbyshire.	<i>N. contraria</i> L.	Vigo Bay.
<i>Achatina panthera</i> Fér.	Madagascar.		

AMPHIDROMOUS SPECIES.

Species in which the proportional numbers of Dextral and Sinistral specimens are about equal.

<i>Amphidromus appressus</i> Mss.	Java.	<i>A. (Ach.) johnsoni</i> Newc.	Swanwich Is.
<i>A. citrinus</i> Brug.	Siam.	<i>A. (Ach.) concinna</i> Newc.	Swanwich Is.
<i>A. comes</i> Pfr.	Siam.	<i>A. (Ach.) cucumis</i> Gul.	Swanwich Is.
<i>A. cambodgensis</i> Rv.	Philippines.	<i>A. (Apex) cestus</i> Newc.	Swanwich Is.
<i>A. entobaptus</i> Dohrn.	I. of Busnanga.	<i>A. (A.) cinerosa</i> Pfr.	Swanwich Is.
<i>A. columellaris</i> Müll.	Tenember.	<i>A. (A.) perversa</i> Swains.	Swanwich Is.
<i>A. jayanus</i> Lea.	Siam.	<i>A. (A.) swifti</i> Newc.	Swanwich Is.
<i>A. interruptus</i> Müll.	Sunda Island.	<i>A. (A.) bicolor</i> Gul.	Swanwich Is.
<i>A. maculiferus</i> Sov.	Philippines.	<i>A. (A.) decora</i> Fér.	Swanwich Is.
<i>A. melanomma</i> Pfr.	Borneo.	<i>A. (A.) mustellina</i> Migh.	Swanwich Is.
<i>A. niversus</i> Müll.	Singapore.	<i>A. (A.) horneri</i> Baldwin.	Swanwich Is.
<i>A. perversus</i> L.	Moluccas.	<i>A. (A.) consanguinea</i> Smith.	Swanwich Is.
<i>A. chloris</i> Rve.	Philippines.	<i>A. (A.) petricola</i> Newc.	Swanwich Is.
<i>Buliminus dormani</i> Binney.	Florida.	<i>A. (A.) longispira</i> Smith.	Swanwich Is.
<i>Partula otaheitana</i> Brg.	Tahiti.	<i>A. (A.) adamsi</i> Newc.	Swanwich Is.
<i>Achatinella (Eburnella) variabilis</i>		<i>A. (A.) lugubris</i> Fér.	Swanwich Is.
<i>Newc.</i>	Swanwich Is.	<i>A. (Laminella) physa</i> Newc.	Swanwich Is.
<i>A. (Eb.) albescens</i> Gul.	Swanwich Is.	<i>A. (L.) straminea</i> Rve.	Swanwich Is.
<i>A. (Eb.) curta</i> Newc.	Swanwich Is.	<i>A. (L.) citrina</i> Pfr.	Swanwich Is.
<i>A. (Eb.) juncea</i> Gul.	Swanwich Is.	<i>A. (L.) alexandri</i> Newc.	Swanwich Is.
<i>A. (Eb.) lactea</i> Gul.	Swanwich Is.	<i>A. (L.) soror</i> Newc.	Swanwich Is.
<i>A. (Achatinellastrum) bilineata</i> Rve.	Swanwich Is.	<i>A. (L.) impressa</i> Pease.	Swanwich Is.
<i>A. (Ach.) dunkeri</i> Cuming.	Swanwich Is.	<i>A. (L.) gravida</i> Fér.	Swanwich Is.
<i>A. (Ach.) olivacea</i> Rve.	Swanwich Is.	<i>A. (L.) venusta</i> Migh.	Swanwich Is.
<i>A. (Ach.) prasina</i> Rve.	Swanwich Is.	<i>A. (L.) tetraoa</i> Pfr.	Swanwich Is.
<i>A. (Ach.) pulcherrima</i> Sw.	Swanwich Is.	<i>A. (L.) sanguinea</i> Newc.	Swanwich Is.
<i>A. (Ach.) castanea</i> Rve.	Swanwich Is.	<i>A. (L.) picta</i> Migh.	Swanwich Is.
<i>A. (Ach.) adusta</i> Rve.	Swanwich Is.	<i>A. (Newcombia) plicata</i> Migh.	Swanwich Is.
<i>A. (Ach.) strigosa</i> Gul.	Swanwich Is.	<i>A. (N.) cumingi</i> Newc.	Swanwich Is.
<i>A. (Ach.) vulpina</i> Fér.	Swanwich Is.	<i>A. (N.) cinnamonia</i> Pfr.	Swanwich Is.
<i>A. (Ach.) crassidentata</i> Pfr.	Swanwich Is.	<i>A. (Amastra) elongata</i> Newc.	Swanwich Is.
<i>A. (Ach.) varia</i> Gul.	Swanwich Is.	<i>A. (Auricula) labrosa</i> Ancey.	Swanwich Is.
<i>A. (Ach.) stewarti</i> Rve.	Swanwich Is.	<i>A. (Aur.) brunnea</i> Smith.	Swanwich Is.
<i>A. (Ach.) trilineata</i> Gul.	Swanwich Is.	<i>A. (Aur.) virens</i> Gul.	Swanwich Is.
<i>A. (Ach.) virens</i> Gul.	Swanwich Is.	<i>A. (Aur.) dwighti</i> Newc.	Swanwich Is.
<i>A. (Ach.) fuscozona</i> Smith.	Swanwich Is.		
<i>A. (Ach.) fulgens</i> Newc.	Swanwich Is.		
<i>A. (Ach.) agusta</i> Smith.	Swanwich Is.		
<i>A. (Ach.) diversa</i> Gul.	Swanwich Is.		

<i>Achatinella (Auricula) mighelsiana Pfr.</i>	<i>A. (Par.) multilineata Newc.</i>
<i>A. (Aur.) abbreviata Rve.</i>	<i>A. (Par.) grisea Newc.</i>
<i>A. (Aur.) rufa Newc.</i>	<i>A. (Par.) dolium Pfr.</i>
<i>A. (Aur.) producta Rve.</i>	<i>A. (Par.) tapanica C. B. Ads.</i>
<i>A. (Aur.) adusta Rve.</i>	
<i>A. (Aur.) tenella Ancey.</i>	<i>A. (Par.) ampulla Gul.</i>
<i>A. (Aur.) uniplicata Pease.</i>	<i>A. (Par.) redfieldi Newc.</i>
<i>A. (Aur.) triplicata Pease.</i>	<i>A. (Par.) splendida Newc.</i>
<i>A. (Aur.) auricula Pfr.</i>	<i>A. (Par.) fasciata Gul.</i>
<i>A. (Aur.) crassula Smith.</i>	<i>A. (Bulimella) rosea Sw.</i>
<i>A. (Aur.) westerlundiana Ancey.</i>	<i>A. (Bul.) candicans Pfr.</i>
	<i>A. (Bul.) ovata Newc.</i>
<i>A. (Partulina) tessellata Newc.</i>	<i>A. (Bul.) decipiens Pfr.</i>
	<i>A. (Bul.) rugosa Newc.</i>
<i>A. (Par.) proxima Pease.</i>	<i>A. (Eburnella) fulva Pfr.</i>
<i>A. (Par.) ventrosa Pfr.</i>	<i>A. (E.) hawaiiensis Bald.</i>
<i>A. (Par.) virgulata Morch.</i>	<i>A. (E.) casta Newc.</i>
<i>A. (Par.) radiata Gld.</i>	<i>A. (E.) rhodorrhapha Smith.</i>
<i>A. (Par.) marmorata Gld.</i>	<i>A. (E.) semicarinata Newc.</i>

PROCEEDINGS OF THE CONCHOLOGICAL SOCIETY OF GREAT BRITAIN & IRELAND.

343rd Meeting, June 21st, 1905.

Mr. Edward Collier (Vice-President) in the chair.

Donations to the Library announced and thanks voted :

The usual periodicals received in exchange.

New Members Elected.

William Freeman, Hawkhurst, Milton Road, Oundle.

Samuel Hainsworth, 60, George Street, Saltaire, Yorks.

John Laycock, 30, Herries Street, Ashton-under-Lyne.

William Whitehead, 25, High Street, Stalybridge.

Candidates Proposed for Membership.

Dr. H. Becker, Grahamstown, Cape Colony.

H. C. Napier, Headington Hill, Oxford.

James Simpson, 52, Castle Street, Aberdeen.

Paper Read.

"Note on *Hygromia rufescens* m. *sinistrorsum*," by the Rev. W. A. Shaw.

Exhibits.

By the Rev. W. A. Shaw : *Hygromia rufescens* m. *sinistrorsum* from Northants.

By Mr. Chas. Oldham : On behalf of Mr. W. Royal Dawson, *Helix pomatia* from Heacham, near King's Lynn, Norfolk. The occurrence of *H. pomatia* in East Anglia has not hitherto been recorded. The habitat given—amongst ivy on walls—is also curious, and very suggestive of the habits of its ally, *H. aspersa*.

By Mr. A. Abercrombie : A series of land and freshwater shells from the Bombay Presidency, and from Kashmir ; also *Ianthina fragilis* from the Bombay coast.

By Mr. F. Taylor : *Cochlicopa lubrica* var. *hyalina* from shore fence, between the Pier and the "Dingle," Colwyn Bay. The variety occurred plentifully, very clean and beautiful specimens, and all of the var. *lubricoides* in form. The few coloured shells found were all typical in shape.

By Mr. R. Standen : A portion of the fine collection of Tasmanian marine shells recently presented, through the good offices of Miss M. Lodder, to the Manchester Museum, by the Victoria Museum, Launceston.

NUDIBRANCHS FROM THE INDO-PACIFIC :

I., Notes on a Collection dredged near Karachi and Maskat.

By SIR CHARLES ELIOT, K.C.M.G.

(Read before the Society, September 13th, 1905).

THE specimens noticed below were dredged by Mr. F. W. Townsend, of the Indo-European telegraph service, near Karachi, Maskat, and various points on the South Coast of Persia, but all, as it would seem, outside the Persian Gulf. The collection comprises the following species :

	No. of Specimens.
1. <i>Bornella digitata</i> Adams & Reeve	... 29
2. <i>Pleurophyllidia semperi</i> Bergh	... 1
3. <i>Pl. taeniolata</i> Bergh ... ..	... 1
4. <i>Linguella sarasinica</i> Bergh ... ..	... 1
5. <i>Thecacera maculata</i> sp. nov.	2
6. <i>Goniodoris modesta</i> (?) A. & H.	1
7. <i>Chromodoris semperi</i> Bergh	1
<i>var. nigrostriata</i> Eliot	4
<i>var. tenuilinearis</i> Farran	2
8. <i>Chr. sannio</i> Bergh	1
9. <i>Chr. pusilla</i> Bergh	1
10. <i>Chr. petechialis</i> (Gould)	4
11. <i>Casella atromarginata</i> H. & A. Adams	1
12. <i>Platydorid townsendi</i> sp. nov.	1
13. <i>Doridopsis miniata</i> A. & H.	9
14. <i>D. rubra</i> (Kelaart)	23
15. <i>D. nigra</i> (Stimpson)	3

The peculiar character of this list is due to the fact that it represents the results of dredging, not of shore collecting ; hence, no doubt, the paucity or absence of *Platydorid*, *Discodoris*, *Asteronotus*, *Hexabranhus* and other forms which are usually abundant in the littoral zone of the Indo-Pacific. But the genera and species are nearly all already recorded from that ocean and are mostly characteristic of it, as *Bornella*, *Chromodoris*, *Doridopsis*, which, in number of specimens, form the large majority of the collection. If the identification of No. 6 with *Goniodoris modesta* A. & H. is correct, the only exception is *Thecacera maculata*. The occurrence in these waters of a form hardly distinguishable from a British species is remarkable.

The collection, therefore, indicates that, as all our other information leads us to anticipate, the Nudibranchiata of the North-West Indian Ocean are at any rate largely the same as those found near the East Coast of Africa, the Philippines, and the South Sea Islands.

BORNELLIDÆ.

Bornella digitata Adams & Reeve.

Eliot, "Nudibranchs from E. Africa and Zanzibar, V.," *Proc. Zool. Soc.*, 1904, vol. 2, pp. 100-102, and references quoted there.

Twenty-nine specimens from Karachi. The living animals are said to have been of a very light flesh colour, with red markings and a red ring or spot near the end of each branch of the cerata.

They all appear to belong to the type of *B. digitata*, not *B. arbor-escens*. The larger are about 30 mm. long., the smaller 15-20 mm. All have at least five pairs of cerata, and the larger have six or seven pairs. The first pair of cerata are nearly always trifid, occasionally quadrifid, and rarely bifid. The second, third, and fourth pairs are generally bifid, but some of them are occasionally trifid. The fifth, sixth, and seventh pairs are simple. The first pair usually bear two branchiæ—less frequently three. The second, third, and fourth two branchiæ, the fifth one branchia, and the sixth and seventh none. The rosettes over the mouth are well developed in all the specimens, and generally contain about twelve tubercles each. The rhinophore sheaths always bear three comparatively short processes in front, and a single conspicuously long one behind.

These specimens are somewhat more liberally furnished with cerata than those which I have found on the East Coast of Africa, and agree in this respect with those described by Bergh from the Philippines, and by Alder and Hancock from the East Coast of India.

PLEUROPHYLLIDIADÆ.

It is somewhat remarkable that so small a collection should contain three species of this family, which is by no means abundant, though widely spread in the Indo-Pacific. The Pleurophyllidiadæ are rare in the littoral zone, and appear to frequent moderate depths, where they are generally found in sand or mud. Two specimens belong to *Pleurophyllidia* and one to *Linguella*, which differs from the former genus in that the anterior margin of the mantle does not form an unbroken fold behind the rhinophores, but passes between them, and is continuous with the surface in front of them.

The species of *Pleurophyllidia* are characterized with a distinctness unusual in Nudibranchs. Besides the dentition, which is different for each known species, good characters are offered by the markings on the back which are generally longitudinal stripes, but sometimes tubercles, by the lamellæ in the underside of the mantle, and the papillæ or other prominences on the tentacular shield.

Pleurophyllidia semperi Bergh. (Pl. V., fig. 7).

Bergh, "Bidrag Monogr. Pleurophyllidierne," p. 37; *Id.*, "Mal. uch," *Semper's Reisen*, vi., p. 249.

One specimen from Maskat, captured in 10-20 fathoms. The notes on the living animal say that the body was of a pellucid bluish tint with patches of dark sepia (almost black), and longitudinal lines of yellow. The rhinophores were tipped with lake. The sole of the foot was blue with a yellow border.

The preserved specimen is 13 mm. long and 6 broad, but much macerated, nearly all the skin, including the gills and side lamellæ, being lost. All that can be made out is that the rhinophores are dark brown with vertical laminæ, and that the back bears traces of thin longitudinal stripes of bright metallic white with a yellowish tinge.

The jaws are of a clear pale yellow, with 4-6 rows of distinct blunt denticles.

The radula consists of 35 rows, with from 30-35 teeth on each side of the rhachis. The rhachidian tooth is rather broad, with four strong denticles on each side of the central cusp. The first lateral is rather large and clumsy, with four small irregular denticles on the outside. The rest are hamate, rather slender and elongate. The first five or six of them bear one or two small denticles near the apex. The remainder are smooth.

The coloration and dentition seem to indicate that this is *P. semperi*, though if I correctly understand Bergh's description, the jaws bore no denticles in the specimens examined by him. The species is recorded from the Philippines.

Pleurophyllidia taeniolata Bergh. (Pl. V., fig. 1).

Bergh, "Bidrag Monogr. Pleurophyllidierne," pp. 42-46.

One specimen from Maskat, captured in 37-38 fathoms. A sketch of the living animal represents it as moderately elongated. The back is pale bright yellow, marked with purplish lines. The side lamellæ are reddish brown. The sides of the foot and the tentacular shield are purplish black.

The preserved specimen, which is slightly bent, is about 42 mm. long and 21 mm. broad. The colour of the back is greyish violet of various shades, in places very deep and nearly black. The mantle, tentacular shield and foot are all edged with pale yellow. Down the back run 34 pale yellowish stripes, of which 19 are much more distinct than the others. They are not quite straight or parallel to one another, and sometimes meet and unite. It will be noticed that whereas in the sketch the ground colour appears to be yellow with purple lines, the relative preponderance of colours is reversed in the preserved specimen. This is a not uncommon phenomenon in preserved Nudibranchs. The foot is whitish with a faint pinkish tinge. The gills and side lamellæ are greyish, with traces of black

here and there. They are numerous, very thin, rather large and foliaceous. The rhinophores are close together, violet with yellow tips. They bear vertical lamellæ. The mantle edge is continuous behind them and deeply indented. No caruncle is visible. The tentacular shield is pale violet grey with ample auriculate ends.

The jaws bear at least eight rows of denticles, behind which are smaller projections resembling a tessellated pavement.

The radula consists of 45 rows with a formula of about 55.1.1.1.55. The median tooth has a strong central cusp with one denticle on each side rather high up, and five lower down. The first lateral bears 5-6 denticles on the external side, and the next few laterals 4-5. After that the number does not exceed three, and towards the end of the row is two or one only. The last 10-12 teeth are quite smooth. The teeth have slender projections behind the bases, as in Bergh's figure (*loc. cit.*, plate vi., fig. 5).

In spite of some slight differences of colour, I think this specimen may be referred to *P. taeniolata*, recorded hitherto only from Mozambique.

Linguella sarasinica Bergh. (Pl. V., fig. 2).

Bergh, "Weitere Beiträge zur Kenntnis der Pleurophyllidien" *Verh. K. K. zool.-bot. Gesellsch. Wien*, 1890, pp. 10-12.

One specimen from Charbar captured in ten fathoms. According to the notes, the animal, which varied its shape continually, was drab-grey, turning to slate-grey, with white spots surrounded by a margin of the same colour as the dorsal surface, but darker. The under surface was "pellucid like a jelly fish." The buccal mass was protruded (apparently during life) and pinkish.

The preserved specimen is nearly circular, being 15 mm. long and 14 mm. broad. The mantle margin is unusually broad, measuring 8 mm. The back is brownish grey, bearing flat white tubercular spots with dark-grey centres. A few larger ones are set in approximately regular rows and are about 1.5 mm. wide. The rest are about half that size. The tentacular shield is covered with small white tubercles and the anterior part of the body is arranged in the manner characteristic of the genus. The foot and tentacular shield are bordered with white. The gills are set on the under side of the broad mantle edge, but no cleft is visible. They are twenty-five to thirty in number, and, as a rule, each large one is followed by two small ones. The side lamellæ are not very numerous, being only about twenty. They are set slant-wise and not parallel to the sides of the body.

The buccal mass is very large and of a bright orange colour. The jaws bear at least six series of distinct denticles and smaller prominences behind them, resembling a tessellated pavement. The

radula consists of thirty-two rows, containing about one hundred teeth, as a maximum, on each side of the rhachis. The rhachidian teeth are shaped much as in Bergh's plates, with hollowed out bases, but the denticles are somewhat less numerous. There are generally seven or eight on each side of the central cusp, of which two or three are on the cusp itself. The first lateral is broad and bears five denticles on the outside: the next two laterals bear four or five denticles. After that the teeth appear bifid (except a few which are quite smooth), but below the two prongs there is often one and sometimes two small denticles.

This specimen is probably referable to *L. sarasinica*, recorded from the East Coast of Ceylon.

DORIDIDÆ PHANEROBRANCHIATÆ.

Thecacera Fleming.

This little known genus appears not to have been examined since the time of Alder and Hancock. They describe three British species, and mention that Darwin found another in the Chonos Archipelago on the West Coast of South America.

Thecacera is practically a *Polycera* with large rhinophore sheaths. The three British species seem to be well distinguished from one another. *T. pennigera* is white with spots of black and brilliant orange. It has no distinct oral veil, the branchiæ are three, the extra-branchial appendages two, and the formula of the radula is 3 + 2. o. 2 + 3. *T. virescens* is peach-coloured with green markings. The rhinophore sheaths are small and simple: the branchiæ five, encircled with a row of obtuse tubercles: the formula of the radula 5 + 2. o. 2 + 5. *T. capitata* is white with greenish brown markings. It has a tuberculate oral veil and tubercles on the sides of the back: seven branchiæ with a stoutish lobe on each side; and a radula with the formula 4 + 2. o. 2 + 4.

The species described below is very closely allied to *T. pennigera*.

Thecacera maculata sp. nov.

Cf. Alder & Hancock, "Mon. Brit. Nudibr.", *Thecacera*, gen. 5. *Thecacera pennigera*, fam. 1, pl. 21a.

Two specimens from Karachi, evidently much contracted and distorted. The largest, which is almost globular, is 6 mm. long, 5 mm. broad, and 6 mm. high. The smaller is somewhat more elongate.

The notes on the living animals say that they would not extend themselves, but remained curled up. The body was of a very light flesh colour, with black spots, and a few orange-red spots. In the smaller specimens both kinds of spots were much more numerous. The rhinophores and branchiæ were splashed with orange red. The intestines showed through the semi-transparent body.

Both the preserved specimens are of a dirty opaque-white, with orange-yellow pigment on the appendages, rhinophore-sheaths and branchiæ. The larger specimen has a few orange-yellow spots on the anterior part of the body, and a few large greenish-black spots here and there. In the smaller specimens the colours are similar, but both the black and yellow spots are much more numerous and more generally distributed, though smaller.

The anterior part of the body seems to be much as in Alder and Hancock's plate of *Thecacera pennigera*. No oral tentacles or oral veil are visible, and the anterior margin of the foot is so much contracted that its characters cannot be safely formulated. The foot, as preserved, is rather narrow and terminates in a distinct tail. The dorsal surface is smooth, and there is no trace of a mantle edge. The rhinophores are perfoliate, and surrounded on three sides by large and solid sheaths, which are open on the inside. The outline appears to have been as in Alder and Hancock's plate, but it is difficult to be certain. The branchiæ also appear to be as represented by Alder and Hancock, and may be counted as either three or five, the lateral plumes being deeply cleft. The plumes are stout and mostly bi-pinnate. Behind the branchiæ are two stout cylindrical appendages, quite simple and showing no trace of division. The integuments contain many spicules, which are fairly straight and bear numerous little knobs or short branches.

The central nervous system is yellowish, and markedly granulate. The cerebro-pleural ganglia are roundish, not distinctly divided into two halves; the pedal ganglia are pear-shaped. The jaws are yellowish-brown and bear a wing-shaped process as in *Polycera*. The cutting edge is irregular, but not denticulate. The radula consists of nine rows in both specimens, the formula being $9 \times 3 + 2$. o. $2 + 3$. The rhachis is bare, the two innermost teeth yellowish-brown, the three outer colourless. The first lateral is hamate, rather small, and has a projection on the side just above the base which is fairly long. The second lateral is considerably larger than the first, but with a narrower base. The lower part of the side projects considerably as a prominent ledge. The third tooth is much flatter, but bears a low cusp, and the base is prolonged into a short tail; this tail is visible also in the fourth tooth, which is a mere plate without any cusp. The fifth tooth is a small curved plate. The liver is greyish and not divided; it is covered by the whitish hermaphrodite gland. The penis is long, and bears a thick armature of minute hamate spines.

This species approaches so closely to *T. pennigera* that one may doubt if it is not identical with it. The difference in habitat and climate (*T. pennigera* being recorded only from the British coast) makes identity improbable, but the only certain points of difference

are (1) that the third tooth has a distinct cusp, whereas in Alder and Hancock's plate of *T. pennigera* it is quite flat; and (2) that the spicules are straighter and more uniformly nodulous. It is also possible that the animal may have a longer and more distinct tail than *T. pennigera*. It therefore seems best to regard the species as probably separate, and to await a further examination of the living animal.

Goniodoris Forbes.

Ten species have been referred to this genus:

1. *G. nodosa* (Mtg.).
2. *G. castanea* A. & H.
3. *G. aspersa* A. & H.
4. *G. citrina* A. & H.
5. *G. modesta* A. & H.
6. *G. danielsseni* Friele & Hansen.
7. *G. flavidula* Bergh.
8. *G. obscura* Stimpson.
9. *G. punctata* Bergh.
10. *G. barroisi* Vayssière.

The tropical forms are not well known. *G. flavidula* appears to be known only by a figure (Bergh, "Semper's Reisen," Heft v., pl. 25, fig. 10), and *G. aspersa*, *G. citrina*, and *G. modesta* have not hitherto been recorded since the publication of Alder & Hancock's "Notice of a collection of Nudibranchiate Mollusca made in India" (*loc. cit. infra*).

The species here described is probably *G. modesta* A. & H., though as it is represented by only one small specimen, and as Alder & Hancock apparently made their description only from a drawing, some doubt as to the identity is possible.

G. castanea is recorded not only from the Atlantic and Mediterranean, but also from Otago, New Zealand, the identification being vouched for by Bergh ("Semper's Reisen," vi., ii., p. 89).

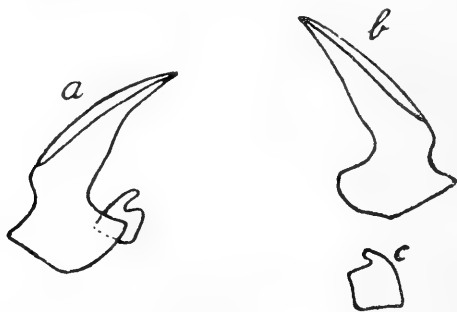
Goniodoris modesta (?) Alder & Hancock.

Alder & Hancock, "Notice coll. Nudibr. made in India," *Tr. Zool. Soc.*, vol. 5, p. 132, pl. 28, fig. 12, 1864.

One specimen from Karachi. Mr. Townsend remarks of the living animal, "Colouring dark brown, more or less mottled; large branchiæ very light brown, small points (?) dark brown." The preserved specimen is purplish brown with traces of lighter mottlings but no indications of the pale margin mentioned by Alder and Hancock. Its total length is 12 mm., and the maximum breadth across the branchiæ 5.5 mm. A third of the total length is formed by the long thin tail, which is only 1.3 mm. broad. The general shape is as described by Alder & Hancock. The sides of the mantle are thin and sinuated,

"meeting in a point behind the branchiæ, and thence forming a slight crest to the tail." The "two lobes before the dorsal tentacles," however, were not visible, the mantle edge appearing to be rounded in this part. On the surface of the back, between the branchiæ and rhinophores, are four ridges which may, however, be merely wrinkles caused by the preserving fluid, as the specimen is clearly contracted. The rhinophores are large, perfoliate, with no trace of pockets. The branchiæ appear to be three, entirely unconnected with one another, one on each side and one anterior, distant 4 mm. from the others. The side branchiæ are very large and strong, resembling valves with five lobes. What I interpret as the anterior branchia is so small that its nature is doubtful, and it may be merely the jagged termination of a ridge. A rough pencil sketch which accompanies the specimen represents two large feathery branchiæ only, one on each side, but as two is a very rare if not unique number for these organs, the presence of a third plume seems probable. The foot is very narrow and grooved in front. The head and oral tentacles are retracted and not large.

The buccal mass is minute, but the buccal crop attached to it by a short stalk is clearly visible. A careful examination, however, failed to detect a labial armature. Alder & Hancock found none in *G. citrina*, and according to Bergh's description it is hardly present in *G. castanea*. The minute radula consists of 32 rows of transparent teeth with the formula $1+1. 0. 1+1$. The innermost teeth are relatively large, hamate, indented behind near the base, with a rather solid body but slender hook, which has a projecting margin without denticulations. The outermost teeth were very small and flat, but with a minute hook, as in *G. castanea*.



Goniodoris modesta.—*a*, half a row of teeth; *b*, first tooth separately; *c*, second tooth separately.

This form appears to be a *Goniodoris*, and to agree both in colour and shape with *G. modesta*, but the branchiæ are neither as described by Alder & Hancock, nor as usual in the genus. Alder & Hancock

say, "No specimen of this very distinct species was in the collection," from which it may be inferred that their description was made entirely from the drawing, so that mistakes may have occurred. The original drawing must have been better than my copy of the printed plate if it enabled them to see all the details they record.

DORIDIDÆ CRYPTOBRANCHIATÆ.

Chromodoris Alder & Hancock.

About 130 species of this genus have been described, mostly from external characters only. Further examination and particularly a comparison of living specimens will probably show that this number ought to be considerably reduced. The best specific distinctions seem to be those afforded by the radula and labial armature, although these certainly vary in size according to the age of the individual and perhaps in other respects. The coloration and pattern are strikingly varying, and animals of widely different appearance are found to be connected by intermediate forms. It would seem that the human eye is not quite impartial in estimating variations of colour. As long as the coloration is subdued and the pattern indefinite, considerable variation is accepted without question within the limits of a species. A striking example of this is *Archidoris tuberculata*, which ranges from clear pale yellow to dark brown, with or without mottlings of grey, green, or pink. But when the coloration is vivid and the pattern distinct and symmetrical there is a strong tendency to create new species, although the amount of variation may not be greater than that exhibited in *A. tuberculata*.

Of the species described here, *Chr. sannio* seems the most distinct, having tubercles on the back (an unusual character in this genus) and spherical glands below the mantle edge. *Chr. semperi* appears to be connected by clear intermediate links with *Chr. nigrostriata* and *Chr. tenuilinearis*, which must hence be regarded as varieties. This is a very interesting case of variation, because it shows how remarkably distinct lines, which appear specifically characteristic, can be broken up into spots and dots, producing a pattern in which there are no lines at all.

Chr. pusilla (hitherto known only by a figure) belongs to a group characterized externally by having a few longitudinal lines on the back, and internally by having bifid teeth, with a few denticles below the bifurcation. *Chr. lineata*, *Chr. hilaris*, and probably *Chr. magnifica* all belong to this group, and are perhaps merely varieties of one species.

Chr. petechialis belongs to a group characterized externally by a coloured border round the mantle, and spots on the dorsal surface. The teeth are not bifid but denticulate and rather erect. *Chr.*

pallescens, *Chr. inornata* and probably many others which are imperfectly described belong to this group.

***Chromodoris semperi* Bergh.**

var. *nigrostriata* = *Chr. nigrostriata* Eliot.

var. *tenuilinearis* = *Chr. tenuilinearis* Farran.

Bergh, "Mal. Untersuch.," *Semper's Reisen*, xi., pp. 482-484; Eliot, "Nudibranchs from E. Africa and Zanzibar, IV.," *Proc. Zool. Soc.* 1904, vol. 1, pp. 394-395; Farran, "Opisthobranchiate Mollusca," *Ceylon Pearl Oyster Report*, p. 342, 1905.

In describing *Chr. nigrostriata*, I hinted that it might prove to be a mere variety of *Chr. semperi*, in spite of some marked differences of coloration, and the present series of specimens seems to show that the two forms pass into one another and cannot be satisfactorily separated.

One specimen from Karachi is described as follows in the notes on the living animal: "Semi-transparent, slatey-greyish flesh colour with bright orange spots, and irregular spots and streaks of deep purple, almost black. The spots on the tail end are much clearer than those on the fore end. The upper part of the body is darker and brighter than the lower part. The six points (*i.e.*, branchiæ, as is shown by a rough sketch) are marked very prettily with a row of orange spots and an alignment of dark purple." These colours are still fairly well kept in the preserved specimen. The ground colour is greyish, marked with fine black lines, which are often broken up into short streaks or dots, especially on the sides of the body and behind the rhinophores. The back and sides are covered with dull yellow spots which are specially thick near the branchiæ and on the tail. The central part of the back, between the rhinophores and branchiæ, is darker than the next and almost black.

Length 21.5 mm., maximum breadth 7 mm., height 6.5 mm. The shape is high and fairly stout. The texture is quite smooth and soft.

The foot is narrow, grooved, and expanded in front with tentacular angles. The tail projects behind. The mantle margin is very narrow and bears no visible glands or projections. The oral tentacles are longish and digitate. The pockets of the rhinophores and branchiæ are only very slightly prominent. The branchiæ are six, simply pinnate. They bear an extremely elegant pattern, composed of two fine black lines between which is a row of yellow dots, on the outside, and of a single black line on the inside, at the bottom of which still remains a bright yellow spot.

The buccal mass is large, and the salivary glands long. The labial armature is a complete and fairly strong yellow ring, composed of short, thick, mace-like hooks. There are distinct prominences on each side of the main hook. The yellow radula consists of 85 rows,

containing about 100 teeth on each side of the rhachis. They are bifid, bearing one, often not very large denticle below the strongly hooked cusp. The innermost teeth are rather irregular, being sometimes simply bifid, and sometimes bearing one or even two denticles on the inner side. The outermost teeth are low and bear three or four serrulations on the broad apex.

This specimen comes very near to the typical *Chr. semperi* as described by Bergh. The only difference of importance is that it bears lines which are frequently broken up into spots, whereas the typical form has no lines but spots only.

Chr. semperi var. **nigrostriata.**

Four specimens from Maskat. The notes on the living animal say the body was pellucid blue with deep purple diagonal streaks and yellow spots. The branchiæ pellucid yellow with a red alignment.

The largest preserved specimen is 35 mm. long, 11 mm. broad, and 15 mm. high, being thus high and fairly stout in build. In all the specimens the tail projects and, as preserved, is turned up. The ground colour varies in the different specimens from slatey-blue to grey, and bears two sets of markings. (1) A pattern of lines varying from deep purplish black to slate colour. In one specimen the lines are much as described by me (*loc. cit.*) in specimens from Zanzibar, rather stiff and looking as if they were deeply engraved. In two they are thin, but rather more freely drawn, more curved, and with numerous branches. In the fourth they are not numerous, but much broader than in the ordinary specimens, being bands rather than lines. (2) Yellow spots which show traces of having been of a peculiarly vivid colour. They are not blotches, but roundish spots, the largest not more than 2 mm. in diameter, and most much smaller. They are arranged fairly symmetrically in the interstices of the dark lines, and form a more or less regular border round the mantle and the foot. The pockets of the rhinophores and branchiæ are slightly raised. The rhinophores are long, deeply perfoliate, grey (probably representing red). The branchiæ are longish, eight in number, simply pinnate, grey with remains of vivid yellow pigment inside, but no black lines. The mantle is moderately ample over the head. The foot narrow, expanded markedly in front, with a deep groove and tentacular angles, which are as much as 4 mm. long.

The buccal mass is rather large, and the salivary glands 12 mm. long and 2 mm. broad. The radula and labial armature are as described above for *Chr. semperi*, but the innermost teeth appear to have regularly a single denticle on the inside.

I think that the differences between these specimens and the specimen first described are not sufficient to constitute more than a

variety. The red lines on the branchiæ seem a connecting link between the elaborate pattern found in *Chr. semperi* and the pure red branchiæ of *Chr. nigrostriata* from Zanzibar.

Chr. semperi var. **tenuilinearis** Farran.

Two specimens from Maskat, which agree with the above described var. *nigrostriata* in general characteristics, but differ somewhat in colour. They are about 20 mm. long. There are no notes on the living animals.

The colour as preserved is pale greyish green of various shades. The rhinophores and branchiæ are brownish grey, probably representing an original red.

In one specimen there is a fairly regular reticulate pattern on the back and sides formed by the intersection of a few lines, which are mostly dark green of varying intensity, though some are black. In the interstices of the pattern are white spots, which are sometimes formed by the confluence of two or three smaller ones.

In the second specimen there are no lines at all on the sides, and the lines on the back are faint and appear to be of much the same colour as the rest of the dorsal surface, but to be rendered more conspicuous by having a white stripe on each side. There are three rows of whitish spots on the back and two on each side of the body.

The labial armature and radula are as described for var. *nigrostriata*. The innermost teeth are distinctly trifid.

These specimens, particularly the second, resemble very closely Mr. Farran's *Chr. tenuilinearis* from Ceylon, from which they differ only in having whitish spots as well as lines.

Chromodoris sannio Bergh. (Pl. V., fig. 3).

Bergh, "Mal. Untersuch.," *Semper's Reisen*, xvii., p. 939.

One specimen, apparently from Maskat.

The notes on the living animal say merely, "Deep purple spots, orange round margin." According to a rough sketch, the back is yellowish with purple spots. Round the margin of the mantle runs a border of orange spots, separated from one another by equal intervals. The sides of the body are faintly purple, and the foot has a distinct purple border. The rhinophores and branchiæ are purple.

The preserved specimen is stoutly built, 20 mm. long, 13 mm. broad, and 11 mm. high. The back is arched; the colour is yellowish white. Round the mantle-edge are distinct traces of a border, consisting of alternate patches of orange and white. The sides of the body are sloping, but the free-mantle margin is not wide. The foot is rather narrow (6 mm.); the tail projects a little behind the body; the back is covered with scattered, small-pointed tubercles, lighter in colour at the top. About twelve are rather larger than the others, and

smaller ones are set in a circle round each of them, but there are others scattered between these figures, and the pattern is not very conspicuous or symmetrical. On the under side of the mantle margin, just to the left of the tail, are two spherical glandular bodies, with a diameter of about 2 mm. The foot is distinctly grooved in front, with projecting corners. The oral tentacles are retracted. The sheaths of the rhinophores are slightly raised. The edge of the branchial pocket is also slightly raised and turned outwards. The branchiæ are ten, simply pinnate. The anal papilla is central, and rather large.

The labial armature is faint, composed of bifid rods, set so as to make a tessellated pavement. The radula is small, colourless, and crowded. The teeth are erect, with two prongs at the top, and 4-6 denticles below; the outermost are lower than the others, and irregularly serrate at the top; the innermost have an accessory denticle on the side nearer the rhachis, but I did not see more than one such denticle.

Chromodoris pusilla Bergh. (Pl. V., fig. 6).

Bergh, *Journ. Mus. Godeffroy*, vi., 1874, pl. 1, figs. 18-20; *Id.*, *Notes Leyden Mus.*, vol. 9, 1887, p. 309, foot-note.

One specimen from Muskat. It is solidly built, being 19 mm. long, 6.5 mm. broad, and 6 mm. high. The colour is uniform greyish drab with five narrow stripes on the back. The inside of these stripes is only a little deeper than the rest of the ground colour, but the edges are bordered by darker lines. The medium stripe runs from the branchiæ to the rhinophores. The two outermost form an ellipse passing round the rhinophores and touching the sides of the branchial pocket, but not extending behind it; the remaining two lines are intermediate and join this ellipse at the pockets of the rhinophores and branchiæ. It would appear from the sketch and notes on the living animals that the original coloration was white and bright scarlet.

The back is flat and quite smooth. The foot is grooved in front and projects behind. The branchial and rhinophorial pockets are very slightly raised. There is hardly any mantle margin at the sides, and even over the head and tail it is narrow. The branchiæ are twelve and set in a complete circle.

The labial armature is yellow and continuous but divided into two halves by a deep groove. The elements are shaped like short hooks or maces and form a very elegant mosaic. The radula consists of sixty-nine rows of yellowish teeth, of which there are at most fifty-five on either side of the rhachis. The teeth are bifid and bear usually four but occasionally five to six denticles below the bifurcation. The prongs of this bifurcation and the upper denticles are rather long and

distinct, but when there are more than four the lower are small. The outermost teeth are lower than the rest, and squarish, with three or or four jags on the top. The innermost have on the inside one distinct denticle and two or three smaller ones. From the top they appear trifid.

To judge from its coloration this animal is *Chromodoris pusilla*, which is only known by a drawing made by Graeffe, and published by Bergh. It was apparently found in the Islands of the South Pacific.

The form is closely allied to *Chr. lineata*, *Chr. hilaris* and other striped species, and is probably merely a variety, but may be retained as a species, provisionally, since the coloration is very distinct.

Chromodoris petechialis¹ (Gould).

Gould, "U.S. Exploring Exped.," 1838-42, vol. 12, p. 296, atlas, figs. 391, 391a; Eliot, "Nudibranchs from the Pacific," *Proc. Malac. Soc.*, 1904, pp. 231-2.

Three specimens. The locality is not stated, but they are with others said to come from Karachi. The notes on the living animal say "Pellucid substratum; edge bright orange; irregular spots deep crimson." The branchiæ are said to have been anemone-like and colourless; the rhinophores short and colourless.

The specimens are of much the same size and colour. That from which the following description is taken is about 11 mm. long, 7.5 mm. broad, and 4.5 mm. high. The general colour is a reddish-white, with a distinct light border, but no trace of the crimson spots, which have no doubt become diffused. The animal is quite smooth and soft, but not gelatinous. The foot is folded together, but apparently would not be narrow if spread out. The anterior margin bears a broadish shallow groove. The tentacles are retracted. The mantle edge is ample, and overhangs the body all round. The branchiæ are twelve, set in a semicircle, with a short spiral at the ends, simply pinnate; they are colourless, with white lines on the pinnæ. The rhinophores bear about twenty perfoliations, marked by white lines.

The intestines are mostly of a deep reddish-purple, and the buccal mass bears blotches of the same. The central nervous-system has a strong reddish-yellow tinge which is deeper on the pedal ganglia than on the cerebro-pleural. The labial armature is a complete ring, purplish towards the outside and greenish-yellow towards the inside. The elements are bent rods, with rather irregularly cleft ends. They are shorter on the inside than on the outside.

The radula is colourless and transparent, consisting of forty-five rows, containing at most about sixty teeth on either side of the rhachis,

1. It is possible that these specimens are the same as the animal described as *Chr. histrio* by Bergh in "The Danish Expedition to Siam," 1889-1900, p. 184, pl. ii., fig. 22, but the name *petechialis* has priority.

which bears indistinct triangular thickenings. The teeth are very erect; those near the middle of the half-rows bear 7-8 denticles rather high up on the outer side; the outermost are taller and more erect than is usual in the genus, and bear 4-5 denticles on the apex. The innermost are broad, and have a prominence on the inner side, bearing 3-4 ridge-like denticles; the second are also broader than the others, but I could not see any denticles on the inner side.

This animal clearly belongs to the same group as *Chr. petechialis*, *Chr. tumulifera*, *Chr. pallescens*, and *Chr. inornata*, and is perhaps best referred to the first of these species, though there are some differences of detail in the labial armature and radula.

Casella atromarginata (Cuv.).

Bergh, *Journ. Mus. Godeffroy*, vi., 1874, pp. 102-9; *Id.*, *Semper's Reisen*, xvii., p. 942; Eliot, "Nudibranchs from E. Africa and Zanzibar, IV.," *Proc. Zool. Soc.*, 1904, vol. 1, pp. 399-400.

One specimen captured in ten fathoms off Tahiri.

The living animal is said to have been of a drab tint, thickly mottled with olive-drab; the sides olive-drab, mottled with white; on the margin of the mantle was a dark purple edging. This coloration is illustrated by a rough sketch, which also shows the rhinophores as purple and the branchiæ edged with purple. There is no coloured border round the foot.

The preserved specimen is contracted longitudinally, with the result that it has become almost circular, being about 35 mm. long and 32 mm. broad. The foot is only 15 mm. broad. The mantle margin is ample, thick, and undulated. The general effect of the coloration is drab, but it is composed of a reddish-brown ground, in which, apparently beneath the skin, are numerous aggregations of whitish dots; these become yellower near the edge, imparting a distinct yellowish tinge; the underside is similar, but darker. The mantle margin is marked by a distinct black line between two white ones. The rhinophores are large and black, the edges of the pockets slightly raised. The branchial pocket is also slightly raised and crenulate, but, as preserved, contracted and closed. The branchial circuit appears to be much larger than the aperture can ever have been, and it is not clear how the plumes emerge; they are simply pinnate, twenty-four in number, and arranged in a double spiral, each half of which contains eight plumes outside and four inside.

The buccal cavity is extremely large, particularly the anterior portion, and the radula is in comparison small; the formula is $225 \times$ about $65.0.65$. The teeth are colourless, crowded and very small. The cusps are tall, and all the denticles are low down and hard to see. In the interior part of the row there are generally five denticles, more

rarely six or seven; in addition to this, the two innermost teeth bear two or three denticles on the inside. Towards the end of the rows the teeth have only one or two denticles, and the outermost teeth are quite smooth.

This specimen suggests that *C. cincta* and *C. atromarginata* may be varieties of one species. The living animal seems to have had very much the coloration of *C. cincta*, but, as preserved, there is no reason why it should not be referred to *C. atromarginata*.

Platydorid Bergh.

This genus belongs to the group of Cryptobranchiate Dorids which have hamate teeth, no labial armature, and usually tripinnate branchiæ. It is distinguished from the other genera by its peculiar hard consistency, and the armature of the genitalia. The outermost teeth are often serrulate. The animals are usually very flat, with broad mantle margins, and in the tropics are very common under stones in the littoral zone. Outside the tropics the genus is recorded from the Mediterranean, but the *Doris planata* A. & H. of the British coasts appears to be a *Geitodoris*, not a *Platydorid*. *Pl. variolata* has been removed by Bergh to *Anisodoris*. The following list of species is taken from Bergh's "System der Nudibr. Gasterop.," with some additions and alterations.

1. *Pl. argo* L.
2. *Pl. philippi* Bergh.
3. *Pl. canariensis* (*D'Orbigny*).
4. *Pl. punctata* (*D'Orbigny*).
5. *Pl. angustipes* (*Mörch*).
6. *Pl. arrogans* Bergh.
7. *Pl. brunnea* Bergh.
8. *Pl. eurychlamys* Bergh.
9. *Pl. formosa* (*A. & H.*).
10. *Pl. ellioti* (*A. & H.*).
11. *Pl. striata* (*Kelaart*).
12. *Pl. inframaculata* (*Abraham*).
13. *Pl. coriacea* (*Abraham*).
14. *Pl. speciosa* (*Abraham*).
15. *Pl. murrea* (*Abraham*).
16. *Pl. scabra* (*Cuvier*).
17. *Pl. sordida* (*Quoy & Gaimard*).
18. *Pl. vicina* Bergh.
19. *Pl. (?) variegata* Bergh.
20. *Pl. hepatica* (*Abraham*).
21. *Pl. tabulata* (*Abraham*).
22. *Pl. pulchra* *Eliot*.

23. Pl. incerta *Eliot*.
24. Pl. (?) papillata *Eliot*.
25. Pl. herdmani *Farran*.
26. Pl. (?) spinulosa *Farran*.
27. Pl. townsendi *sp. nov.*

A good many of the above species are incompletely described, and those marked with ? possess features not altogether in accord with the characters of the genus.

Platydoris townsendi sp. nov. (Pl. V., fig. 4).

One specimen dredged in 180 fathoms off Ras Maidani.¹ When first dredged the animal is said to have been hard and horny, and apparently dead. After being kept in water for some time, it put forth branchiæ and rhinophores, and felt softer. A sketch accompanying these notes depicts a flat pinkish Dorid, with an undulated margin and three rows of darker spots of pinkish brown. The rhinophores and branchiæ are also pinkish, the latter spotted, and six or seven in number, set in circle open behind.

As preserved, the specimen is horny but flexible, with the dorsal surface finely granulated. The length is 52 mm., and the breadth 34 mm. The mantle edge is wavy and ample, measuring 11 mm. at the sides, 9 mm. over the head, and 5 mm. over the tail. The colour has become a whitish yellow with reddish brown spots of irregular shape, very much darker at the edges, so that they have an annulate appearance. They are arranged in three rows, of which the median contains one behind and three in front of the branchiæ (the foremost being between the rhinophores), the left hand row four, and the right hand row only two. There are also faint traces of spots round the margin. The spots are due to the interstices between the dorsal granules being filled with red pigment, the tips of the granules remaining yellow. This red pigment can be scraped off. The underside of the specimen is pure yellow.

The tentacles are rather long and digitate. The foot is grooved and notched in front, but not widely expanded at the side of the notch. The edges of the rhinophorial and branchial pockets are slightly raised and irregularly crenulate. The rhinophores are large, yellow with a few reddish dots and thickly perfoliate. The branchiæ are also yellow, spotted with reddish brown, six or seven in number, according as a branch on the right is regarded as a separate plume or not.

The labial cuticle contains a few rods, but nothing which can be properly called a labial armature. The formula for the radula is about 102 × 120. o. 120. The teeth are longish and simply hamate,

¹ Apparently opposite Maskat, between Chahbar and Jask.

but the outermost bear two or three accessory denticles below the main hook. The verge is armed with scales bearing large spines, pyramidal or slightly hooked.

This specimen bears a general resemblance to the figures of *Kentrodoris annuligera* (Bergh, "Semper's Reisen," plate xli., fig. 1), of *Doris maculosa* Quoy & Gaimard, and of *Doris funebris* Kelaart (Alder & Hancock, "Notice coll. nudibr. made in India," plate xxx., figs. 9 and 10) which Bergh in his memoir on the Opisthobranchs collected by Kükenthal in the Moluccas and Borneo (*Abh. Senckenb. Ges.*, vol. 24, 1898) considers to be synonyms. But it certainly is not *K. annuligera*, and *D. maculata* and *D. funebris* are spotted on the foot. Still it is quite possible that they may represent this animal as much as *K. annuligera*.

Pl. herdmani Farran, from Ceylon ("Opisthobranchiate Mollusca," *Ceylon Pearl Oyster Report*, 1905, p. 337) seems allied, but neither the colour nor the dentition are quite the same.

DORIDOPSIDÆ.

Doridopsis Alder & Hancock.

This is one of the most numerous, both in species and individuals, of the genera of Nudibranchs to be found in the Indo-Pacific. Of the forms mentioned below *D. nigra* and *D. rubra* are very abundant, and *D. miniata*, though it has not been recorded since Alder & Hancock, is said by them to be common on the East Coast of India.

As in *Chromodoris*, the external appearance and coloration are extremely variable, and it is difficult to distinguish between species and varieties. *D. rubra*, *D. fusca*, and *D. brockii* are perhaps all varieties of one species. *D. nigra* is protean in its transformations. As there is no radula in this genus, and the internal organs offer few characters which can be used for classification, there is a danger not only of creating unnecessary species, but also of overlooking real but inconspicuous differences, and a closer examination of the texture and other characters of the living animals than has hitherto been possible is much needed.

Doridopsis miniata Alder & Hancock.

Alder & Hancock, "Notice coll. Nudibr. made in India," p. 130, pl. xxxi., fig. 18.

Nine specimens of this form from Karachi. They are in an unusually good state of preservation, and, though there is no note as to the appearance of the living animal, seem to have maintained the original shape and colour. The tubercles, foot and mantle edge are orange. The surface of the back is of a darker purplish tint, but the whole animal gives a general impression of deep orange.

The texture is stiff and spiculous, and the shape very flat. The largest individual is 23 mm. long and 10 mm. broad. The margin of the mantle is wide and undulated, and the margin of the foot almost equally so, there being thus a deep groove all round the animal between the two laminae. The back bears a number of small and rather distant tubercles; they are irregular in shape, and bear secondary excrescences; the largest are about 0.8 mm. high, but they become smaller towards the mantle edge; they are connected by a network of slightly-raised spiculous lines, which is distinctly visible from the underside of the mantle edge and from the inside of the dorsal integuments. The rhinophore pockets are raised and smooth. The gill pocket is the same, not indented and turned outwards. The gills are consistently five in number, but vary somewhat in position; in three specimens at least the arrangement is clearly that described by Alder & Hancock, the anus lying close to the root of the left anterior plume. The anterior margin of the foot is indistinctly grooved, and there are two flattish tentacles. The intestines are yellow and of the usual type. From the buccal cone issues a long, thin, yellow tube, bent in the usual way and of almost uniform breadth until it expands into a globular dilatation, just before entering the liver. The verge is armed with numerous colourless spines, some simply hamate, and some recurved with the tip bent backwards. The numerous spicules are colourless, transparent, and of very various shapes; some are simple, generally tapering towards the ends, and either straight or bent; others have an accessory branch, and are either shaped like a fork or the letter Y, or else are straight with a single short projection on the side, about the middle of their length. None, however, appear to be cruciform, or to have more than a single branch; they are arranged in a reticulate pattern, which stands out very strongly on the underside of the mantle.

I think this animal is Alder & Hancock's *D. miniata*, of which they say that it is vermilion coloured, but that there is a variety (probably represented by the present specimens) much paler with the centre of the back nearly black. They do not, however, mention the expanded margins of the foot, which is one of the most prominent characters of the form here described.

The stiff consistency of this form might lead one to assign it to *Doriopsilla*, but the buccal ganglia have long connectives and are situated posteriorly.

Doridopsis rubra (Kelaart).

Bergh, "Danish Exped. to Siam; Opisthobranchia," p. 190-1.
Eliot, "Nudibranchs from E. Africa and Zanzibar, VI.," *Proc. Zool Soc.*, 1904, vol. 2, p. 279.

Twenty-three specimens, apparently from Karachi, though the locality is not stated. They vary in length from 1 cm. to 3.5 mm., and in most the back is strongly arched, perhaps merely as a result of contraction. The red colour is still visible in a few specimens, and from their all being put together under one heading, it may be assumed that they were all of much the same colour in life. As preserved they are mostly purplish grey, with various lighter and darker mottlings of the same colour. The characters correspond with previous descriptions. The texture is smooth and flabby. The edges of the mantle and foot are thin, moderately wide, and much undulated. The branchiæ are set very far back, and the pocket as preserved is very shallow. The anterior margin of the foot appears to be indifferently either grooved or entire.

Doridopsis nigra (Stimpson).

Alder & Hancock, "Notice coll. Nudibr. made in India," p. 128; Bergh, "Mal. Untersuch.," *Semper's Reisen*, xvii., p. 964; Eliot, "Nudibranchs from E. Africa and Zanzibar, VI.," *Proc. Zool. Soc.*, 1904, vol. 2, p. 275.

The collection contains only one individual, but, as it is described as "a small specimen of a common species," the form is probably abundant in these waters, as it is in most parts of the Indo-Pacific. It is 11 mm. long and 8 mm. broad. The living animal is said to have been black or very deep purple, with a deep crimson line near the edge. This probably means a line round the mantle margin. If so it has disappeared, but the margins of the foot have a distinct light border. The surface is quite smooth without tubercles and the branchiæ are six. The animal should probably be classed under the variety of this polymorphic species known as var. *atroviridis*, although the hitherto recorded specimens of that variety had spotted backs.

The collection also contains two specimens possibly referable to this form noticed by me (*loc. cit.*) already. The integuments are extremely thick and tough, and I doubt if the animals are really *D. nigra*, but without a fuller account of their characters when alive it is impossible to be certain.

Faunistic Notes.—I found *Sphærium lacustre* in abundance dead on the dried mud of a small pond, on a village green near Coldred, in Kent, on high ground far from water. No other molluscs were seen. The pond seemed too small and too close to houses to have been visited by wild fowl. I have found *Stenogyra octona* fairly abundant and breeding in the Tropical Fern Houses at Kew. I believe Mr. Sykes exhibited some from the forcing pits there some fourteen years ago. It seems quite established there. The colony of *Turricola terrestris*, near Dover, is flourishing, though it does not seem to have extended its limits much.—[Rev. Canon] J. W. HORSLEY (*Read before the Society*, September 13th, 1905).

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No. 9.

Constitution & List of Members
OF THE
CONCHOLOGICAL SOCIETY
OF
GREAT BRITAIN AND IRELAND.

- 1.—This Society shall be called “The Conchological Society of Great Britain and Ireland.”
- 2.—Its object shall be the promotion of the science of Conchology, by the holding of Meetings for the reading and discussion of original papers, by the publication of proceedings, and by the formation of a Library and Collections illustrative of the science.
- 3.—It shall consist of Ordinary and Honorary Members.
- 4.—Ordinary Members shall be proposed by two Members at one meeting, and balloted for at the next. They shall pay, in advance, on the 1st January in each year, a subscription of 5/—, or may compound for life by the payment of Three Guineas. If on December 31st of any year a member shall be three or more years in arrear with his or her subscription, the Council shall erase his or her name from the list of members, and shall take whatever steps seem desirable for recovery of the arrears. The Council shall further report the erasure of such names to the next meeting of the Society with a view to their publication in the Journal.
- 5.—Composition Fees shall be invested in Books, Cabinets, or other permanent property, or in such other manner as the Council may think most conducive to the benefit of the Society.
- 6.—The number of Honorary Members shall be limited to ten, and they shall be exempt from all payments and have the privileges of Ordinary Members.
- 7.—It shall be governed by a Council, consisting of a President, four Vice-Presidents, a Treasurer, a Secretary, a Curator, a Recorder, a Librarian, and six other members, who shall be elected annually by ballot; the voting paper issued to be returned to the Secretary, under cover of sealed envelope.

- lope, addressed to the Scrutineers. The President and Secretary of the Leeds and London Branches and such other branches as may afterwards be accepted at an annual meeting shall, *ex officio*, also be members of the Council of the Society.
- 8.—The Presidency shall not be tenable for more than two years continuously, and the President is expected to give an address.
 - 9.—The meetings shall be held monthly, at the time and place fixed by the Council, who shall also have power to arrange such additional meetings as they may think desirable.
 - 10.—Three shall be a quorum at all meetings.
 - 11.—The Annual Meeting shall be held at such time and place as may be fixed at the previous Annual Meeting, to receive the Reports and Balance Sheet of the out-going Council, and to elect a Council and Officers for the ensuing year.
 - 12.—The accounts, before being presented, shall be audited by two members, appointed at a previous meeting.
 - 13.—The proceedings shall be published periodically, under the direction of the Council.
 - 14.—The Capital and Property shall be vested in two Trustees, elected by the Society.
 - 15.—No alterations in the rules shall be made, unless by a majority of three-fourths of the members present at a meeting which has been specially summoned.

The **Annual Subscription** is **Five Shillings** due on the 1st January in each year.

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- 1889. Binney, Wm. G., 222, E. Union St., Burlington, New Jersey, U.S.A.
- 1889. Cossmann, Maurice, 95, Rue de Maubeuge, Paris.
- 1897. Dall, Wm. Healey, A.M., D.Sc., Smithsonian Institution, Washington, U.S.A.
- 1878. Kobelt, Dr. Wilhelm, Schwanheim, Frankfurt-am-Main.
- O. P Nelson, William, Gandy Row, Crossgates, Leeds.
- 1905. Pelseneer, Prof. Paul, 53 Boulevard Léopold Grand, Ghent, Belgium.
- 1889. Sars, Prof. G. O., Universitet, Christiania, Norway.
- 1889. Simroth, Dr. Heinrich Rudolph, Kregelstrasse 12, Leipzig-Gautsch.
- 1905. Strebel, Dr. Hermann, Naturhistorisches Museum, Hamburg.

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- 1903. Abbott, G., 83, Russell Street, Kettering.
- 1905. Abercrombie, A., Staneswood, Fallowfield, Manchester.
- 1885. P Adams, Lionel Ernest, B.A., Oak Hill, Chart Road, Reigate, Surrey.
- 1899. Appleton, Thos. Alf., M.R.C.S., 46, Britannia Rd., Fulham, London, S.W.
- 1895. Arnold, Bernard, F.L.S., Milton Lodge, Gravesend, Kent.
- 1886. Baillie, William, Brora, near Golspie, Sutherlandshire.
- 1897. Baldwin, D. D., M.A., Hamakuapoko, Maui, Hawaiian Islands.
- 1899. Baldwin, Joseph W., 472, Darwen Road, Dunscur, near Bolton, Lancs.
- 1895. Barker, Reginald Hawksworth, Grosvenor Bank, Scarborough.
- 1903. Becher, Major E. F., R.A., 2, Berkeley Villas, Pittville, Cheltenham
- 1905. Becker, Dr. H., F.L.S., F.S.A., Grahamstown, Cape Colony.
- 1901. Beeston, Harry, Hawkestone, Havant, Hants.
- 1904. Bellini, Prof. Raffaello, R. Scuolo Tecnica, Chivasso, Torino, Italy.
- 1904. Benn, C. A., B.A., F.G.S., Pudleston Court, Leominster.
- 1901. Bentley, R. H., 33, Church Crescent, Muswell Hill, London, N.
- 1901. Birley, Miss Caroline, 14, Brunswick Gardens, Kensington, London, W.
- 1897. Blackburn, Rev. Ed. Percy, Wesley House, Dixon's Green, Dudley, Worcestershire.
- 1897. Blackmore, Jas. Chanter, F.G.S., 36, Whatley Road, Clifton, Bristol.
- 1899. Bladen, W. Wells, Stone, Staffordshire.
- 1897. Blake, Wm. Charles, 2, Acacia Villas, Ross, Herefordshire.
- 1895. Bles, Edward J., B.Sc., Zoological Department, University, Glasgow.
- 1897. Bliss, Joseph, Boar Bank Hall, Grange-over-Sands, Lancashire.
- 1899. Blundell, Mrs. Jessie M., Argyll House, Cirencester.
- 1897. Bolton, Herbert, F.R.S.E., Museum, Bristol.
- 1904. Booth, Fred, 43, Victoria Road, Saltaire, Yorks.
- 1884. Bostock, Edwin D., Holly House, Stone, Staffordshire.
- 1897. L Boycott, Arthur Edwin, 7, The Square, Carshalton, Surrey.
- 1879. *Brazier, John, F.L.S., C.M.Z.S., Curaçoa House, 82, Windmill Street, Sydney, N.S.W.

1905. Breun, Louis A., 4, Greek Street, Soho Square, London, W.
 1900. *L* Broadbent, Dr. G. H., 8, Ardwick Green, Manchester.
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 1905. Bromehead, G. N., Merton College, Oxford.
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 1879. Butterell, J. Darker, Manor House, Wansford, Hull.
 1902. Button, Fred. L., 969, Broadway, Oakland, California.
 1888. Byne, Loftus St. George, M.Sc., Ermefield, Ivybridge, Devon.
1891. Cairns, Robert, 159, Queen Street, Hurst, Ashton-under-Lyne, Lancs.
 1893. Carphin, Mrs. Janet, 7, Lockerbie Cottages, Liberton, Edinburgh.
 1901. Carter, Chas. S., 8, Bridge Street, Louth, Lincs.
 1878. *P* Cash, William, F.G.S., F.R.M.S., 35, Commercial Street, Halifax
 1903. Cattell, W. Chas., The Poplars, Montagu Street, Kettering.
 1901. Chadwick, Wm. H., Harrogate, Nether Street, North Finchley, London, N.
 1892. Champ, Hy., c/o S. & J. Watts & Co., Portland Street, Manchester.
 1905. Charnley, Jas. Robert, F.Z.S., F.E.S., The Avenue, Moor Park, Preston.
 1895. *P* Chaster, George Wm., M.R.C.S., 42, Talbot Street, Southport, Lancs.
 1887. Chaytor, R. C., Scafton Lodge, Middleham, Bedale, Yorks.
 1904. Chichester, Rev. Charles, Shirwell Rectory, Barnstaple.
 1889. Christy, Robert Miller, F.L.S., Pryors, Broomfield, nr. Chelmsford, Essex.
 1904. Clapp, Geo. H., 325, Water Street, Pittsburgh, Pa., U.S.A.
 1886. Coates, Henry, F.R.S.E., Pitcullen House, Perth.
 1880. Collier, Edwd., Glen Esk, Whalley Range, Manchester.
 1898. Collinge, Walter Ed., M.Sc., University, Birmingham.
 1897. Cook, Rev. Thomas, Whinwood, Westcliff Grove, Harrogate.
 1901. Cooke, Rev. Alfred H., M.A., Aldenham School, Elstree, Herts.
 1892. Cooper, James Eddowes, 68, North Hill, Highgate, London, N.
 1895. Corker, Jas. S., Rose Lea, Mellor Road, Mellor, near Marple.
 1890. Crawford, James, c/o J. C. Kemsley and Co., Port Elizabeth, Cape Colony.
 1899. Crowther, J. E., Portland Street, Elland, Yorks.
 1879. Cundall, Jas. W., 3, Orlando Road, Clapham Common, London, S.W.
1886. DaCosta, Solomon I., 9, Gloucester Square, London, W.
 1897. Dacie, John Charles, 30, Montserrat Road, Putney, London, S.W.
 1904. Dalglish, Gordon, 29, Larkfield Road, Richmond, Surrey.
 1903. Darbishire, A. D., M.A., B.Sc., Royal College of Science, London, S.W.
 1886. Darbishire, Robert D., High Elms, Victoria Park, Manchester.
 1899. Darnbrough, Frederick, Croft Villa, Eaglescliffe, Yarm-on-Tees.
 1897. Dautzenberg, Ph., 213, Rue de l' Université, Paris.
 1898. Dean, J. Davy, 84, Dale Street, Lancaster.
 1892. Dixon, James Bassett, Ribblesdale House, Preston, Lancs.
 1901. Drummond, Robt., 20, Upper Talbot Street, Blackpool.
 1901. Dyson, W. O., 41, Whiteley Street, Oldham.
1892. Eccles, John Christopher, 20, Winckley Square, Preston, Lancs.
 1895. Edwards, Thos., Cliftonville House, Equity Rd., Narborough Rd, Leicester.
 1901. Edwards, W. H., Hastings Museum, Victoria Institute, Worcester.
 1891. Elgar, Hubert, Museum and Public Library, Maidstone, Kent.

1904. *Z* Eliot, Sir Chas., K.C.M.G., Endcliffe Holt, Endcliffe Crescent, Sheffield.
 1884. Elliot, Edward J., High Street, Stroud, Gloucestershire.
 1901. Ensor, A. R., 60, Lumley Road, Skegness, Lincolnshire.
 1894. Evans, Wm., F.R.S.E., 38, Morningside Park, Edinburgh.
 1897. *Z* Farquhar, John, 3, Rose Terrace, African Str., Grahamstown, Cape Colony.
 1891. Farrer, Captain Wm. James, Chapel House, Bassenthwaite, Keswick.
 1897. Fielding, Clement, M.P.S., Clover Hill, Halifax, Yorks.
 1890. Fierke, Frederick Wm., 73, Redbourne Street, Hull.
 1884. *Z* Fitzgerald, Rev. H. Purefoy, Wellington College, Berks.
 1886. Fitzgerald, Mrs. J., Kapai, Maidstone Road, Headcorn, Kent.
 1898. Fitzsimons, J. B., M.D., 14, Owen Street, Hereford.
 1905. Foster, Miss Amy C. S., 45, Belsize Square, London, N.W.
 1905. Freeman, William, Hawkhurst, Milton Road, Oundle.
 1904. Frew, Dr. Alexander, 12, St. James' Terrace, Hillhead, Glasgow.
 1892. Fulton, Hugh, Kew Gardens, near London.
 1887. Gerland, Conrad, M.Sc., Ph.D., F.C.S., Meadow Bank, Accrington.
 1898. Glover, Miss Maria, 124, Manchester Road, Southport, Lancs.
 1886. *Z* Godlee, Theo., Whips Cross, Walthamstow, Essex.
 1897. Godwin-Austen, H. H., Lt.-Col., F.R.S., etc., Nore, Hascombe, Godalming, Surrey.
 1902. Gower, Harry D., 55, Benson Road, Croydon.
 1904. Gravely, F. H., Dalton Hall, Victoria Park, Manchester.
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 1905. Green, Wm. A., 4, Salisbury Terrace, Chichester Park, Belfast.
 1886. Greene, Rev. Carleton, M.A., Gt. Barford Vicarage, St. Neots, Huntingdon.
 1904. Grierson, P. H., Land Commission Office, Dublin.
 1901. Gubbins, Mrs., Westwood Ho!, N. Devon.
 1890. Gude, G. K., F.Z.S., 114, Adelaide Road, Hampstead, London, N.W.
 1886. Gwatkin, Rev. Prof. H. M., D.D., M.A., 8, Scrope Terrace, Cambridge.
 1905. Hainsworth, Sam, 60, George Street, Saltaire.
 1897. Hall, Thos. Bird, Larch Wood, Rock Ferry, Cheshire.
 1902. Hall, W. J., Manchester Museum, University, Manchester.
 1905. Hamling, J. G., F.G.S., The Close, Barnstaple.
 1902. Hampson, Travis, Nuthurst, Hartopp Road, Four Oaks, Sutton Coldfield.
 1895. Hann, Rev. Adam, Wesley House, Rochdale.
 1895. Hardy, John Ray, Manchester Museum, University, Manchester.
 1895. Hardy, John, 11, Stockton Road, Chorlton-cum-Hardy, near Manchester.
 1887. Hargreaves, J. A., 3, Ramshill Road, Scarborough, Yorks.
 1897. Harrison, Miss G. M., 14, Queen's Road, Southport, Lancs.
 1904. Harrison, Russell C., 17, Tooting Bec Rd., Upper Tooting, London, S.W.
 1889. Hartley, Alfred, 19, Thorpe Garth, Idle, near Bradford, Yorks.
 1887. Harvard, T. Mawson, 23, Northbrook Road, Lee, London, S.E.
 1903. Hawkins, John, J.P., 35, Avenue Road, Grantham.
 1887. Heathcote, Wm. Henry, F.L.S., 119a, Fishergate, Preston, Lancs.
 1896. Herdman, Prof. W. A., D.Sc., F.R.S., The University, Liverpool.
 1887. Hey, Thomas, 8, Bloomfield Street, Derby.
 1895. Hibbert, Charles R. C., Riccard's Down, Abbotsham, Bideford, Devon.
 1895. *P* Hickson, Prof. Sydney J., D.Sc., M.A., F.R.S., University, Manchester.
 1893. Hill, John, Little Eaton, near Derby.
 1886. *Z* Hillman, Thomas Stanton, Eastgate Street, Lewes, Sussex.
 1886. Holmes, W. J. O., F.L.S., Strumpshaw Hall, Norwich.

1891. Horsley, Rev. Canon J. W., St. Peter's Rectory, Walworth, London, S.E.
 1884. Howell, George O., 210, Eglinton Road, Plumstead, Kent.
 1892. Howorth, Sir Henry Hoyle, K.C.I.E., M.P., F.R.S., etc., 30, Collingham Gardens, London, S.W.
 1886. *P*Hoyle, W. E., M.A., D.Sc., Director of the Manchester Museum, University, Manchester.
 1895. Hudson, Rev. Hy. A., 445, Stretford Road, Manchester.
 1905. Hutton, W. Harrison, 44, Dial Street, Leeds.
 1901. Jackson, J. Wilfrid, 18, Bedford Avenue, Manley Park, Manchester.
 1891. Jenner, James Herbert Augustus, F.E.S., 209, School Hill, Lewes, Sussex.
 1904. Jennings, F. B., 152, Silver Street, Upper Edmonton, London, N.
 1894. Jones, Kenneth Hurlstone, M.B., F.L.S., R.N. Barracks, Chatham, Kent.
 1901. Jukes Browne, A. J., F.G.S., Floriston, Cleveland Road, Torquay.
 1897. *L* Kennard, A. S., Benenden, Mackenzie Road, Beckenham, Kent.
 1902. Kensett, Percy F., Broadmeadow, Coombe Lane, Wimbledon, London, S.W.
 1897. Kenyon, Mrs. Agnes Fleming, 291, Highett St., Richmond, Melbourne, Victoria.
 1887. Kew, H. Wallis, F.Z.S., 9, Queen's Road, Bromley, Kent.
 1905. Kimber, W. J., Aldinga, South Australia.
 1889. Knight, Rev. G. A. Frank, M.A., F.R.S.E., St. Leonard's Bank, Perth.
 1901. Laidlaw, F. F., M.A., University, Manchester.
 1899. Lancaster, Ernest Le Cronier, B.A., M.B., Winchester House, Swansea, S. Wales.
 1879. Laver, Henry, M.R.C.S., F.L.S., Head Street, Colchester, Essex.
 1894. Lawson, Peter, Jesmond Dene, 87, Finlay St., Fulham, London, S.W.
 1905. Laycock, John, 30, Herries Street, Ashton-under-Lyne.
 1900. Lebour, Miss M. V., Radcliffe House, Corbridge-on-Tyne, Northumberland.
 1878. Leicester, Alfred, 148, Liscard Road, Liscard, Cheshire.
 1899. Lightfoot, Robert M., South African Museum, Cape Town.
 1903. Linter, Miss J. E., Saville House, Twickenham.
 1896. Linton, John, 25, Wordsworth Road, Smallheath, Birmingham.
 1897. *L* Lodder, Miss Mary, Bank of Australasia, Launceston, Tasmania.
 1895. Loydell, A., 36, Milton Road, Acton, London, W.
 1898. Lucas, B. R., 3, Dyar Terrace, Winnington, Northwich, Cheshire.
 1891. Lyons, Lady, Kilvrough, Parkmill, R.S.O., Glamorganshire, S. Wales.
 1889. MacAndrew, James J., F.L.S., etc., Lukesland, Ivy Bridge, Devonshire.
 1903. McClelland, Hugh, Bryn, Somerville Road, Sutton Coldfield.
 1885. McKean, Kenneth, The Homestead, Monkton Combe, near Bath.
 1886. McMurtrie, Rev. John, M.A., D.D., 13, Inverleith Place, Edinburgh.
 1884. Madison, James, Turves Green, West Heath Rd., Northfield, Worcestershire.
 1885. Marquand, Ernest D., Knyghtwood, St. Martin's, Guernsey.
 1887. Marshall, J. T.
 1887. *P* Masefield, John R. B., M.A., Rosehill, Cheadle, Staffordshire.
 1904. Massy, Miss A. L., 9, St. James's Terrace, Malahide, Dublin.
 1905. Maxwell, Mrs. Miller, Bangholm Bower, Goldenacre, Edinburgh.
 1897. May, William Lewis, F.R.S. Tasm., Forest Hill, Sandford, Tasmania.
 1889. Mayfield, Arthur, Mendlesham, Stowmarket, Suffolk.
 1880. *P* Melvill, James Cosmo, M.A., F.L.S., Meole Brace Hall, Shrewsbury.
 1891. Middleton, Robert, Gledhow, near Leeds.
 1888. * Milne, J. Grafton, Holly House, Plaistow, London, E.
 1904. Milne, James N., Foylemore, St. Jude's Avenue, Belfast.

1879. Milnes, Rev. Herbert, M.A., Darley House, Berkeley St., Cheltenham.
 1891. Mitchell, James, 240, Darnley Street, Pollokshields, Glasgow.
 1902. Moore, Chas. H., 5, Mill Street, Stocks Lane, Stalybridge.
 1891. Moss, William, F.C.A., 13, Milton Place, Ashton-under-Lyne.
 1905. Napier, H. C., Headington Hill, Oxford.
 1903. Nash, P. B., 135, Melfort Road, Thornton Heath, Surrey.
 1899. Neild, J. E., Merlewood, Queen's Road, Urmston, near Manchester.
 1887. Newstead, A. H. L., B.A., 38, Green Street, Bethnal Green, London, E.
 1891. Newton, Richard Bullen, F.G.S., 11, Twyford Crescent, Acton Hill, London, W.
 1891. *P* Norman, Rev. Canon Alfred Merle D.C.L., F.R.S., etc., The Red House, Berkhamstead.
 1903. Northey, Rev. A. E., M.A., Lisworney, Torquay.
 1901. Norton, Miss E. M., 20, Eastfield Road, Westbury-on-Trym, near Bristol.
 1901. Oelrichs, W., 22, Hackins Hey, Liverpool.
 1887. Oldham, Charles, Brook Cottage, Knutsford, Cheshire.
 1899. Orr, Hugh Lamont, 29, Garfield Street, Belfast.
 1896. Overton, Harry, Innisfallen, Highbridge Road, Wylde Green.
 1905. Owston, Alan, Yokohama, Japan.
 1903. Pace, S., Marine Station, Millport, N.B.
 1900. Pannell, Chas., 13, East Street, Haslemere, Surrey.
 1882. *P* Parke, George H., F.L.S., etc., St. John's, Wakefield, Yorks.
 1904. Parritt, H. W., 8, Whitehall Park, Upper Holloway, London, N.
 1887. Parry, Lieut.-Col. G. S., 18, Hyde Gardens, Eastbourne, Sussex.
 1898. Partridge, F. J., 75, High Street, Barnstaple, N. Devon.
 1902. Pattison, Ernest, 52, Regent Road, Leicester.
 1886. Pearce, Rev. S. Spencer, M.A., Long Combe Vicarage, near Woodstock Oxfordshire.
 1901. Penrose, G., Royal Institution of Cornwall, Truro.
 1904. Platt, Thos. H., 73, Clarendon Road, Manley Park, Manchester.
 1886. Ponsonby, John H., F.Z.S., 15, Chesham Place, London, S.W.
 1905. Poole, W. G., South Lawn, Godalming, Surrey.
 1898. Poore, Arthur S., Heather View, West Heath Road, Bostall Heath, Abbey Wood, Kent.
 1895. Powell, Mrs. A., Nant-y-Velin, Criccieth, N. Wales.
 1903. Preston, Henry, F.G.S., Hawthornden Villa, Spittlegate, Grantham.
 1897. Preston, Hugh Berthon, F.Z.S., 3, Sydney Terrace, Fulham Road, London, S.W.
 1896. Ragdale, John Rowland, The Beeches, Whitefield, near Manchester.
 1899. Ramanan, Vedaraniyam Venkata, M.A., F.Z.S., 12, Sami Pillai Street, Triplicane, Madras, S. India.
 1904. Redding, J. R., 17, Victoria Villas, Clontarf, Dublin.
 1905. Reynolds, Laurence R., P.O. Box 1293, Seattle, Washington, U.S.A.
 1905. Reynolds, William G., 15, Alfoxton Avenue, West Green, London, N.
 1896. Rhodes, John, F.E.S., 360, Blackburn Road, Accrington, Lancs.
 1900. Richards, C. P., Mission House, Stenalees, St. Austell, Cornwall.
 1898. Roberts, A. William Rymer, The Common, Windermere.
 O *P* Roebuck, Wm. Denison, F.L.S., 259, Hyde Park Road, Leeds.
 1901. Rooth, J. A., M.R.C.S., 14, St. George's Place, Brighton.
 1905. Rope, Geo. T., Blaxhall, Tunstall, Suffolk.
 1893. Roseburgh, John, Market Square, Galashiels, Roxburgh.
 1892. Rosevear, John Burman, 109, New King's Rd., Fulham, London, S.W.

1877. *P* Scharff, Robert F., Ph.D., M.R.I.A., Tudor House, Dundrum, Dublin.
 1895. *L* Schill, C. H., The Elms, Byrom Lane, Macclesfield.
 1904. Scott, Miss Gwynedd, 4, The Terrace, Riding Mill-on-Tyne.
 1886. Scott, Thomas, F.L.S., 280, Victoria Road, Aberdeen.
 1893. Shackelford, Rev. Lewis John, Lambeth Street, Queen's Park, Blackburn, Lancs.
 1904. Shaw, Rev. W. A., Haselbeech Rectory, Northampton.
 1904. Sherrin, W. R., 38, Fielding Road, Chiswick, London, W.
 1895. Sich, Alfred, F.E.S., Corney House, Chiswick, London, W.
 1896. Sidebotham, Dr. E. J., Erlesdene, Bowdon, Cheshire.
 1905. Simpson, James, c/o G. Sim, Esq., A.L.S., 52, Castle Street, Aberdeen.
 1884. Skilton, Mrs. Mary, 21, London Road, Brentford, Middlesex.
 1902. Smallman, Raleigh S., Wressel Lodge, Wimbledon Common, near London.
 1903. Smallwood, Henry W., Holly Mount, Church Road, Moseley, Birmingham.
 1903. Smallwood, Jas. Clarence, Holly Mount, Church Rd., Moseley, Birmingham.
 1886. *P* Smith, Edgar A., I.S.O., F.Z.S., Natural History Museum, Cromwell Road, London, S.W.
 1892. Smith, Mrs. Louisa J., Monmouth House, Monmouth St., Topsham, Exeter.
 1899. *L* Smith, Mrs. Lucy A., Cricklade Street, Cirencester.
 1894. Smith, Wm. Chas., 7, Vanston Place, Waltham Green, London, S.W.
 1896. Smith, Wm. Rayson, Harleston, Norfolk.
 1900. Solly, E. H., 3, South Street, Deal, Kent.
 1886. *L P* Somerville, Alex., B.Sc., F.L.S., 4, Bute Mansions, Hillhead, Glasgow.
 1887. Somerville, Rev. James E., M.A., B.D., Castellar, Crieff, N.B.
 1902. Sorby, Henry Clifton, LL.D., F.R.S., Broomfield, Sheffield.
 1886. Sowerby, Geo. Brettingham, F.L.S., 15, Station Parade, Kew Gardens, near London.
 1892. Span, Bartlet, Woodlands, Tenby, South Wales.
 1900. Stacey, John, 22, Nithdale Road, Plumstead, Kent.
 1886. Standen, Robert, 113, Sewerby Street, Alexandra Park, Manchester.
 1903. Stelfox, A. W., Oakleigh, Ormeau Road, Belfast.
 1904. Stone, R. E. T., Asliffe, 78, Woodstock Road, Oxford.
 1896. Stonestreet, Rev. W. T., Arnside, Prestwich Park, Manchester.
 1885. *L* Storey, J. A., B.A., Mafeking Villa, Locking Road, Weston-super-Mare.
 1897. Stracey, Bernard, M.B., Sutton Bonnington, Loughborough.
 1890. Stubbs, Arthur Goodwin, The Meads Cottage, Hailey Lane, Hertford.
 1893. Stump, Edward Consterdine, 16, Herbert St., Moss Side, Manchester.
 1895. Swanton, E. W., The Educational Museum, Haslemere, Surrey.
 1888. *P* Sykes, Ernest Ruthven, B.A., F.L.S., etc., 3, Gray's Inn Place, Gray's Inn, London, W.C.
 1895. Taylor, Frederick, 32, Landseer Street, Park Road, Oldham, Lancs.
 1897. Taylor, Rev. George W., F.R.S. Canada, etc., St. Matthew's Rectory, Wellington, British Columbia.
 1904. *L* Taylor, Gerald Medland, Rossall School, Fleetwood.
 O P Taylor, John W., F.L.S., North Grange, Horsforth, Leeds.
 1901. Taylor, Thos., Tainui Street, Greymouth, New Zealand.
 1903. Thaanum, D., 5, Church Street, Hilo, Hawaiian Islands.
 1886. Tomlin, J. R. le Brockton, M.A., Mathon Lodge, W. Malvern.
 1898. Turner, E. Hartley, A.C.A., 42, Spring Gardens, Manchester.
 1899. Vaughan, J. Williams, J.P., The Skreen, Erwood, R.S.O., Radnorshire, S. Wales; winter address: St. David's, London Road, Guildford.
 1897. Vignal, Louis, 28, Avenue Duquesne, Paris.
 1902. Vincent, C. W., 39, West Bank, Stamford Hill, London, N.

1902. Wadsworth, J. T., Highfield, Palatine Road, Northenden, Manchester.
 1898. Wakefield, H. Rowland, 7, Montpelier Terrace, Swansea, S. Wales.
 1891. Walker, Bryant, 18, Moffat Building, Detroit, Michigan, U.S.A.
 1905. Walton, H. Maurice, Goodburne House, Richmond, Yorks.
 1902. *L* Watson, Hugh, Bracondale, The Avenue, Cambridge.
 1886. *P* Watson, Rev. R. Boog, LL.D., F.L.S., etc., 11, Strathearn Pl., Edinburgh.
 1900. Webb, Walter, F., 416, Grand Avenue, Rochester, N.Y., U.S.A.
 1895. Webb, Wilfred Mark, F.L.S., Odstock, Hanwell, London, W.
 1902. Weeks, Wm. H., jr., 508, Willoughby Avenue, Brooklyn, U.S.A.
 1895. Welch, Robert John, 49, Lonsdale Street, Belfast.
 1897. West, H. J., 167, Goodrich Road, East Dulwich, London, S.E.
 1905. Whitehead, William, 26, High Street, Stalybridge.
 1886. Whitwell, Wm., F.L.S., Underhill, Kidderminster Road, Hagley, near Stourbridge.
 1901. Wilde, J. W., 17, Hendon Road, Sparkbrook, Birmingham.
 1889. Williams, John M., 31, Grove Park, Liverpool.
 1891. Williamson, Rev. Charles Arthur, M.A., 14, Upper Mount Street, Dublin.
 1890. Wood, Albert, Midland Lodge, Sutton Coldfield, Warwickshire.
 1901. *L* Woodruffe-Peacock, Rev. E. A., F.L.S., etc., Cadney, Brigg, Lincs.
 1898. Woods, Henry, M.A., F.G.S., Sedgwick Museum, Cambridge.
 1886. *L* Woodward, Bernard B., F.L.S., etc., 4, Longfield Rd., Ealing, London, W.
 1903. Worsdale, R., 163, Dudley Road, Grantham.
 1895. Wright, Charles East, Woodside, Rockingham Road, Kettering.

PROCEEDINGS OF THE CONCHOLOGICAL SOCIETY OF GREAT BRITAIN & IRELAND.

344th Meeting, September 13th, 1905.

Mr. Edward Collier (Vice-President) in the chair.

Donations to the Library announced and thanks voted :

"Iconographia Moll. Fossil. in Tellure Tertiaria Hungariæ, etc., inventorum,"
 "Fauna fossile terziaria di Markusevec in Croatia," by Sp. Brusina; "Marine
 Conchology of 'Dee'," by Jas. Simpson; "Opisthobranchiate Mollusca," in Pearl
 Oyster Fisheries Report, by G. P. Farran; "Variation in recent Mollusca," "The
 genus *Anoma* Albers," and "On some Marine Shells from the Austro- and Indo-
 Malayan Regions," by E. R. Sykes; "Zoological Record, Mollusca, 1904,
 Brachiopoda, 1903-4," by E. R. Sykes and E. A. Smith; and "Note on *Limax*
tenellus," by W. Evans (*from the respective authors*); and the usual periodicals
 received in exchange.

Donations to Cabinet announced and thanks voted :

Crepidula fornicata L., a number of remarkably aggregated groups from Mr. J.
 E. Cooper.

New Members Elected.

Dr. H. Becker, Grahamstown, Cape Colony.

H. C. Napier, Headington Hill, Oxford.

James Simpson, 52, Castle Street, Aberdeen.

Candidates Proposed for Membership.

Miss Amy C. S. Foster, 45, Belsize Square, London, N.W.

Alan Owston, Yokohama, Japan.

Geo. T. Rope, Bloxhall, Tunstall, Suffolk.

Member Deceased.

Rev. R. W. J. Smart, M.A.

Papers Read.

"Nudibranchs from the Indo-Pacific: I., Notes on a Collection dredged near Karachi and Muskat," by Sir Charles Eliot, K.C.M.G.

"Reversed Shells in the Manchester Museum," by R. Standen.

"Note on *Crepidula fornicata* L.," by J. E. Cooper.

"Do Swans eat *Anodonta cygnea*?" by Mrs. Jessie M. Blundell.

"Faunistic Notes," by the Rev. Canon J. W. Horsley.

Exhibits.

By Mr. Ed. Collier: *Helicella caperata*, shewing great diversity of form, including var. *ornata* and a curious subscalariform specimen, also *Patella vulgata*, and a number of littoral marine shells, all from Croyde Bay, N. Devon.

By Mr. J. D. Dean: *Vertigo alpestris* from Devil's Bridge, Kirby Lonsdale, Westmorland, the first record of this species for that county.

By Mr. R. Welch: *Calliostoma zizyphinus* and var. *lyonsi*, from shore of Ards Peninsula, near Portaferry, inside mouth of Strangford Lough, and on Rock Angus, in the entrance channel. They occur along a shore area about three miles long, at low water mark. About seven of the variety are present for one of the type, and one hundred living specimens of the variety were picked up in one hour's search. The variety *lyonsi* is recorded in the British Association Dredging Report, 1857-8 as "Dredged, 7-20 fms., rare, Castle Ward Bay, Strangford Lough."

By Rev. L. J. Shackelford: A fine set of *Bulinus auris-vulpina*, from St. Helena.

By Mr. C. H. Moore: *Ancylus fluviatilis*, large, but very thin and fragile, from a well at Stalybridge; *Vitrea cellaria*, *Vertigo pusilla*, *V. alpestris*, *V. pygmæa*, *Jamnia cylindracea*, from Grange-over-Sands; *Vertigo pusilla* and *V. alpestris*, from Cark, Lancashire.

By Mr. F. Taylor: *Succinea oblonga* and var. *alba*, *Vertigo edentula*, and *V. pygmæa* from Braunton Burrows; *Helicigona lapicida* and a beautiful set of var. *albina* from Lynmouth; *Helicella virgata* and var. *alba*, from Barnstaple.

By Mr. Chas. Oldham: *Limnæa auricularia* var. *acuta*, from Budworth Mere, near Northwich.

By Mr. W. Whitehead: *Succinea oblonga*, Braunton Burrows; *Helicigona lapicida* type and var. *alba*, Lynmouth; *Helicella virgata* type, vars. *lutescens* and *alba*, Barnstaple.

By Mr. J. W. Jackson: *Cypræa pantherina*, a fine series of varieties, and *C. mauritiana* var. *calx-equina* M. and S.

By Mr. J. W. Baldwin: *Helicella itala*, type and var. *albida*, *grisea*, and *leucozona*, all of an extremely dwarfed form, from Monsal Dale, Derbyshire; *H. virgata*, type and many varieties, *H. cantiana*, *Helicigona lapicida*, *Helix aspersa*, *H. hortensis*, from Clevedon, Somerset; *Vitrea pura*, *V. crystallina*, *Pyramidula rotundata*, *Hygromia hispida*, *Cochlicopa lubrica*, *Clausilia bidentata*, *Ena obscura*, *Pomatias elegans*, from the Gorge, at Clifton Suspension Bridge, Bristol.

345th (Annual) Meeting, October 21st, 1905.

Held in the Zoological Department, University, Liverpool, in conjunction with the Liverpool Biological Society.

Dr. G. W. Chaster (President) in the chair.

Donations to the Library announced and thanks voted:

The usual periodicals received in exchange.

Appointment of Auditors.

Messrs. J. Wilfrid Jackson and J. T. Wadsworth were reappointed Auditors.

Appointment of Scrutineers.

Messrs. J. R. B. Masefield and C. E. Wright were appointed Scrutineers.

Honorary Members Elected.

On the nomination of the Council, the following gentlemen were elected Honorary Members of the Society :—

Professor Paul Pelseneer, of Ghent ;

Dr. Hermann Strebel, of Hamburg.

New Members Elected.

Miss Amy C. S. Foster, 45, Belsize Square, London, N.W.

Alan Owston, Yokohama, Japan.

Geo. T. Rope, Bloxhall, Tunstall, Suffolk.

Candidates Proposed for Membership.

Mrs. Miller Maxwell, Bangholm Bower, Goldenacre, Edinburgh.

Walter Godfrey Poole, South Lawn, Godalming, Surrey.

Lawrence R. Reynolds, Seattle, Washington, U.S.A.

Annual Report and Balance Sheet.

The Annual Report of the Council (see p. 269), and the Treasurer's Balance Sheet for 1904 (see p. 187), together with the Interim Balance Sheet up to October 15th, 1905 (see p. 270) were presented and adopted.

Reports of the Leeds and London Branches.

The Reports of the Leeds Branch and of the London Branch (see p. 271, 272) were presented and read.

Election of Officers and Council.

The Scrutineers reported that thirty-four valid papers had been received, and that all had voted unanimously for the list of names nominated by the Council. The Officers and Council on the list (see p. 258) were therefore declared to be duly elected.

Address.

After an adjournment for Tea, the members joined the Liverpool Biological Society in order to hear an Address from Prof. W. A. HERDMAN, D.Sc., F.R.S., on "The Visit of the British Association to South Africa."

Afterwards the thanks of the Society were voted to Prof. Herdman for his address, to the Liverpool Biological Society and to the authorities of the University of Liverpool for their courtesy and hospitality.

Exhibits.

By Dr. G. W. Chaster : *Janinia triplicata* Stud., an addition to the British terrestrial mollusca ; series of the British species of *Vertigo* and *Janinia* ; abnormal forms of *Linnaea peregra* ; white-shelled varieties of British mollusca, and typical forms of the same ; series of *Succinea oblonga* from its known British and Irish stations ; and *Linnaea involuta*.

By Mr. Louis B. Breun : A drawing of *Sphaerium rivicola* with three siphons.

By Mr. A. G. Stubbs : A fine series of *Helix pomatia*, colour varieties and growth stages, from Gallows Hill, Hertford ; sets of *Pisidia* and *Paludestrina ventrorsa*, from Southwold, Suffolk ; *Paludestrina jenkinsi* from (1) the New River, Hoddesden, (2) near Eastbourne, (3) neighbourhood of Yarmouth ; many of these have coronets of spines instead of the thread-like keel of var. *carinata* ; *P. stagnalis* of enormous size, some with twisted spires, from Southwold ; also water-colour drawings of *Helicella virgata* and its most striking varieties.

By Mr. Thos. Bird Hall : A very choice series of *Cypraea*, *Conus*, *Marginella*, *Cassis*, *Harpa*, *Murex*, *Strombus*, and *Terebellum*, including some unusually beautiful forms of *Cypraea tigris*, *C. cervus*, and *C. scotti*, one of which is perhaps the

largest and most extraordinarily-marked specimen known, *C. mappa*, *C. vitellus*, *C. thersites*, *C. helvola*, *C. stolidus*, *Marginella pseudofaba*, *Cassis coronulata*, *C. areolata*, *Harpa conoidalis*, *H. rosea*, *Murex saulea*, *Strombus papilio*, *Conus aurisiacus*, *C. victoriæ*, *C. nobilis*, *C. cedo-nulli*, *C. orbignyæ*, *C. granulatus*, *C. vautieri*, and *Terebellum subulatum*.

By Mr. B. R. Lucas: Sinistral living *Valvata piscinalis* and var. *antiqua* of same, from Budworth Mere, Cheshire; sinistral *Bythinia orcula* Bens., from Burmah; some curiously deformed *Planorbis corneus*; and British taken *Helix villosa*, means of introduction not ascertained.

By Mr. J. M. Williams: Two drawers of *Cypræa tigris*, with localities, beautiful specimens of typical and varietal forms.

By Mr. R. Standen: Eggs of many exotic *Helices*, *Bulimi*, *Partula*, and *Lanistes*, accompanied by the shells belonging thereto; turreted forms of *Planorbis umbilicatus*, from Didsbury; sinistral specimen of *Placostylus ouveanus* var. *lifuanus* Crosse; *Sphærium pallidum* Gray, from all its recorded British localities; a fine series of most of the known species of *Odontostomus*, from South America; *Vallonia excentrica*, from U.S.A.; and scalariform examples of *Helicigona arbutorum*, *Helix aspersa*, and *H. pisana*.

By Mr. Thos. Edwards: Series of the British *Rissoæ*; *Avicula hirundo*, taken off Eddystone; *Buccinum undatum*, fine series of scalariform, sinistral, acuminate, carinate, bioperculate, and curiously malformed examples from the Thanet coast; *Neptunea antiqua*, acuminate, sinistral, and malformed, from the Thanet coast; var. *contraria*, Red Crag, and from raised beach, Uddevalla, Sweden; *Fusus longævus*, *F. pyrus*, and *F. regularis*, from Barton Clay.

By Mr. Edward Collier: *Helix nemoralis*, of very large size, from Donegal, Galway, Clare, and Kerry, Ireland; also from Corbeyrier, Switzerland, to illustrate some of Mr. Welch's "habitat" photographs.

By Mr. J. Wilfrid Jackson: A series of photographs of typical habitats of British freshwater mollusca, including the late Mr. Thos. Rogers' original habitat for *Planorbis dilatatus* at Pendleton; Cheshire locality for the same at Dukinfield; present stronghold for the same in canal near Ashton, Lancs.; Mr. F. Taylor's original habitat for *Paludestrina taylori* at Fairfield Locks; view of a very prolific locality for same at Dukinfield; habitat for *Physa heterostropha* in canal near Ashton; sets of the shells of each species shewn to supplement photographs; locality series of *Paludestrina jenkinsi* with var. *carinata*, from Droylsden; Dukinfield; Guide Bridge; Ringley; Sandbach; Norfolk Broads; Derby; Beckton; and Rainham. Also several Tasmanian and New Zealand species, very much resembling *P. jenkinsi* both in form and texture of shell, including *Potamopyrgus corona*, *P. nigra*, and *Bithinella legrandiana*; and two American species resembling *Paludestrina taylori* (= *Annicola brownii*) and *P. imitator*; *Helix pomatia* m. *sinistrorsum*, from Box Hill, Surrey, second British record; and photographs of "snail-borings," Silverdale, Lancs.

By Mr. C. E. Wright: *Helix hortensis*, a number of varieties and band forms from Oundle, Northants; *Helicigona arbutorum* and vars. *fusca* and *canigonensis* from Maidwell Dale, Northants; *Helix nemoralis*, vars. *conica* and *major*, from Eastern Leicestershire; *Limnæa palustris*, vars. *roseolabiata*, *fasciata*, *alba*, and *albida*; *Planorbis corneus*, shewing gradual growth from type to albino.

By Mr. R. Welch: A mass of *Paludestrina jenkinsi*, alive, from a new station, the river at Letterkenny, Co. Donegal, and a comparative series of the west coast of Ireland *Helix nemoralis*, including the large Valentia and Inishmurry Island forms, with the large heavy Dog's Bay fossil form; also much smaller, though in some cases heavy, forms still living near Bunbeg, Carrickfin, Horn Head, Maghery, and Bundoran. Whole-plate photographs of the habitats were shown in some cases,

also a large series of typical and special habitats of both common and rare species in Ireland and England, including *Acicula lineata*, *Vertigo pusilla*, *Jamnia anglica*, *Succinea oblonga*, *Neritina fluviatilis*, *Clausilia laminata*, *Cæcilioides acicula*, *Helicigona lapicida*, *H. arbustorum*, *Helix hortensis*, *Unio margaritifera*, and many others.

By Mr. A. W. Stelfox (per R. Welch) : The results of a ten days' holiday collecting in north-west Donegal, mainly near Bunbeg, a hitherto unworked district. Seventy-four boxes in all were shown, containing sixty-two species and some varieties. Some exceedingly small forms of *Helix nemoralis* from the coast-dunes, and a very thin form from the damp woods of Glenveigh, with a curious form of *Limnæa peregra* var. *candida* [a complete list, with notes, will shortly appear in the *Irish Naturalist*].

Also, on behalf of Rev. W. A. Shaw, a sinistral *Helicigona arbustorum*, from Maidwell Dale, Northants.

ANNUAL REPORT.

Since the date of the last Annual Report, ten meetings of the Society have been held, from October 12th, 1904—September 13th, 1905. On the date of the last Annual Meeting there were 279 members on the society's list ; between that date and the end of the year two new members were elected, one resigned, and two died, so that the list published on the 1st of January last contains 278 names. Since that period sixteen members have been elected, two have resigned, two have died, and two have been struck off the roll for the non-payment of their subscriptions ; so that the list now includes 288 names, and the Council has to congratulate the Society on the net gain of nine members during the year.

Among the honorary members, Dr. R. A. Philippi, of Santiago, Chili, the veteran naturalist, many of whose works are numbered amongst the classics of conchological science, has died. By his loss, and by that of Dr. Eduard von Martens during the previous year, the number of honorary members has been reduced to eight. After careful consideration the Council has decided to recommend to the Society the names of Professor Paul Pelseneer, of Ghent, and Dr. Hermann Strebel, of Hamburg, for election in their stead.

The ordinary members whom the Society has lost by death are :—The Rev. R. W. J. Smart, M.A., Messrs. C. G. Barrett, J. G. Brass, F. P. Marrat, and the Rev. John Hawell. Obituary notices of the last two have appeared in the pages of the *Journal*.

Since our last annual meeting five numbers of the *Journal* have appeared, containing 160 pages, three plates, and a photographic group of the members present at the meeting last year.

During the year donations to the Cabinet have been received from Messrs. G. H. Clapp, J. E. Cooper, and Bartlett Span.

There has been the usual increase in the Library, by reason of the valuable publications received from corresponding societies, and, in addition, most acceptable gifts have been presented by Prof. Sp. Brusina, and Messrs. Wm. Evans, G. P. Farran, G. K. Gude, J. Simpson, E. R. Sykes, and the Secretary.

The Library is not so much used by members as might have been expected from its wealth in works and tracts relating to the descriptive and faunistic sides of the science ; it is possible that this may be due to the difficulty of ascertaining what the Library contains, and that a new catalogue would be a valuable help in this respect. The Council has had under consideration the question of preparing and issuing a new edition of the catalogue, brought up-to-date, but this has hitherto been impracticable owing to the fact that none of the officers have been able to spare the time necessary for preparing such a catalogue for the press.

The Recorder reports that during the past year 219 new comital records have been registered. The majority of these are for Ireland, where Mr. P. H. Grierson has again done excellent work in extending the known range of many species. The Recorder has to thank Messrs. L. E. Adams, H. Beeston, J. E. Cooper, E. W. Swanton, J. W. Vaughan, C. E. Wright, and the Rev. W. A. Shaw, among others, for specimens from various English and Welsh localities. No fresh Scottish records have been established. A reference to the last-published Census (*Journal of Conchology*, vol. 10, pp. 217-237) will shew that the distribution of even some of the more common species is imperfectly known in Scotland, and it is hoped that members who have opportunities for collecting in that part of the kingdom, or who already have Scottish shells in their collections, will submit the specimens for registration. From the Society's authenticated records it is now possible to define approximately the distribution of certain species in England and Wales, although with regard to even these many gaps require to be filled. It is surely only necessary to say that the wider our accurate knowledge of the distribution of any one species becomes the greater the value of the census as a whole, in order to enlist a wider interest in this branch of the Society's work than has obtained in the past.

The practice of holding Special Exhibits of particular genera at the monthly meetings has been continued, and very interesting series of specimens of *Helix aspersa*, *H. nemoralis*, and *H. hortensis* have been shewn.

A compliment has been paid to the Society in the election of its Secretary to serve on the Permanent Commission on Nomenclature of the International Zoological Congress, and the Council has thought it well to print in the *Journal* the recently-revised Rules on Nomenclature drawn up by the Congress, for the guidance of those members who are concerned with this subject, which is exciting so much interest and controversy at the present time. The Society has tried to take its part in the practical work of the subject by issuing lists of the British molluscan fauna; it is believed that most of the names therein adopted will stand the test of further enquiry, and the Council recommends the members of the Society to make use of them in their publications.

Communications have been made to the monthly meetings by twenty-eight different members ; some of these are lengthy memoirs, others merely short notes. The Council cannot help thinking that the number of contributions might be largely increased if members would feel it an obligation to share with their colleagues the pleasure of their captures and the benefit of any information they may acquire. It is only by the spirit of mutual co-operation that a Society such as ours can maintain a vigorous and useful vitality.

Statement of Income and Expenditure

From January 1st to October 15th, 1905.

Receipts.			Expenditure.		
	£	s. d.		£	s. d.
Balance forward ...	15	16 6	Plates and Drawings ...	5	7 10
Subscriptions ...	33	16 9	Bookbinding ...	0	8 0
Lists of Mollusca ...	0	3 4	Reprints ...	4	9 0
			Stationery ...	1	2 6
			<i>Journal</i> , Oct., 1904 ...	11	16 0
			„ Jan., 1905 ...	12	14 6
			„ April, 1905 ...	11	11 4
			Taylor's Monograph, parts		
			10, 11 ...	0	10 6
			Cash in hand ...	1	16 11
	<u>£49</u>	<u>16 7</u>		<u>£49</u>	<u>16 7</u>

The unpaid subscriptions amount to £41, and the outstanding accounts to £39 14s. 8d. There is further a sum to be received from the publishers and from the Secretary for publications sold during the year.

REPORT OF THE LEEDS BRANCH.

Annual Report for the Year ending December 3rd, 1904.

Mr. W. Cash, F.G.S., held the position of President, with Mr. J. W. Taylor, F.L.S., and Mr. W. Denison Roebuck, F.L.S., as Joint Hon. Secretaries, who, however, resigned in May. Mr. Taylor through ill-health and over-pressure of other duties, and Mr. Roebuck as he was leaving England for a lengthened tour abroad. Messrs. F. Booth and J. E. Crowther were elected to fill the vacancies.

Four new members were elected, and eleven meetings were held during the year, with an average attendance of six members with a roll of eleven members on the books. Five of the meetings were held indoors, four in the rooms of the Y.M.C.A. at Leeds, and the fifth in the Church Institute, Bradford. Of the six meetings held in the field, one took the form of an excursion to Cleethorpes, Lincs., for the observation of *Amphipeplea glutinosa*, in one of its few northern habitats. The second meeting was held at Cawthorne, to investigate the occurrence of *Unio pictorum* in the lakes at Cannon Hall Park. The third meeting took place at Saltaire for a visit to Shipley Glen. The fourth meeting was held in connection with the gathering of the Yorkshire Naturalists' Union, at Lawns House, Farnley, Leeds, where by the kindness of Mr. A. H. Pawson, J.P., F.L.S., F.G.S., the President of the Union, the members were entertained at a garden party. A ramble took place in the morning to Bramley Fall Wood, to visit a local habitat for *Zonitoides excavatus*. Another meeting was held at Colton, near Leeds, for a visit to the ponds on Colton Moor, to search for *Limnaea glabra*. The sixth meeting was held at Grassington, in Upper Wharfedale, in the hope of recording a Yorkshire locality for the recently re-established British slug, *Limax tenellus*, a gratification which, however, was not realized; there was too short a period of time to allow of a thorough search being made. The President entertained the members to tea in Grassington, after which Mr. W. Denison Roebuck, F.L.S., read a paper on the "Recent Re-establishment of *Limax tenellus* as a British Slug." This being the last meeting that Mr. Roebuck would attend for a long period, advantage was taken of the occasion to wish him and Miss Roebuck a pleasant and interesting time abroad and a safe return.

During the winter months two papers were given, and a number of varied and instructive exhibits formed a most interesting feature of the meetings.

No addition was made to the Yorkshire list of species during the year, though additions were made in two separate drainage areas, by the recording of *Planorbis umbilicatus* from the old river bed at Keighley, Upper Airedale, by Messrs. F. Booth and F. Rhodes, and the recording of *Zonitoides excavatus* for Upper Wharfedale, during a visit paid to Barden Bridge by Messrs. J. W. Taylor, W. Cash and W. Denison Roebuck.

The club has been officially represented at the meetings of the Yorkshire Naturalists' Union, and reports on investigations made on these excursions have appeared in *The Naturalist*, the organ of the Union. The year passed is considered by the members to have been a very satisfactory one.

F. BOOTH, } Hon. Secs.
J. E. CROWTHER, }

ANNUAL REPORT OF THE LONDON BRANCH.

Since our last report six ordinary meetings and six field meetings have been held. The attendance has been somewhat irregular. At the winter meetings a variety of interesting shells were exhibited by different members. Dr. Rodman's skiagraphs and Mr. F. G. Bridgman's sections of Mollusca shewn on December 2nd, 1904, were particularly good. On January 6th, 1905, Mr. F. R. Jennings brought some beautiful specimens of *Helicigona arbustorum* to illustrate variation in this species. As usual, Mr. J. C. Dacie very kindly entertained our members one evening in March. The April meeting was held at the residence of the Rev. Canon Horsley, when he exhibited the marine shells he had collected at Cette (see p. 222 *antea*).

The field meetings were held at Abbey Wood, on May 6th; Epping Forest, June 3rd; Staines, July 15th; Broxbourne, Aug. 12th; Caterham, Sept. 2nd; and Swanley, Oct. 7th. Generally speaking, Land Mollusca appear to have been unusually scarce this summer, the only noteworthy finds for the season were fine examples of *Vivipara contecta* near Staines, and *Sphyradium edentulum* at Marden Park and in Epping Forest.

9th October, 1905:

J. E. COOPER, *Hon. Sec.*

346th Meeting, November 8th, 1905.

Mr. Alfred Leicester (vice-president) in the chair.

Donations to the Library announced and thanks voted.

The usual periodicals received in exchange.

Donations to Cabinet announced and thanks voted:

By Mr. A. G. Stubbs: *Unio pictorum* var. *p'atyrhynchoidea*, *Anodonta cygnea* varr. *anatina-radata* and *ventriosa*, Hethersett, Norfolk; *Helix pomatia*, adult and young, Gallows Hill, Hertford; *Paludestrina ulva* of large size, *Valvata piscinalis*, *Sphærium lacustre*, *Limnea peregra*, *Paludestrina ventrosa*, all from Southwold, Suffolk; *Vitrea rogersi*, Armwell, Herts.; *Paludestrina jenkinsi* from Acle, Hoddesden, and Litlington.

New Members Elected.

Mrs. Miller Maxwell, Bangholm Bower, Goldenacre, Edinburgh.

Mr. Laurence R. Reynolds, P.O. Box 1293, Seattle, Washington, U.S.A.

Mr. W. G. Pooley, South Lawn, Godalming, Surrey.

The sub-joined letters from Prof. Paul Pelseener and Dr. Hermann Strehel were read:

"Monsieur le Secrétaire,

Je suis particulièrement sensible à la résolution votée en ma faveur, par "The Conchological Society," dans sa réunion annuelle.

L'honneur qui m'est fait a d'autant plus de prix à mes yeux, qu'il vient d'une Association dont le mérite est grandement apprécié et qui jouit dans le monde scientifique d'une si juste renommée.

Veuillez présenter mes remerciements et mes salutations à mes nouveaux confrères, et accepter, avec mes vœux pour la prospérité de votre Société, l'assurance de mes sentiments dévoués.

PAUL PELSEENER,

53 Bd. Léopold, Gand."

Dr. Wm. E. Hoyle,

Secrétaire de the Conchological Society.

"To the Hon. Secretary of the Conchological Society of Great Britain and Ireland :

My Dear Sir,

Your esteemed favour of the 24th inst. informs me that the Conchological Society has resolved to elect me an Honorary Member. I accept this nomination as a great honour, which certainly will excite me to merit it. I beg you heartily to present to the Society my sincerest thanks.

Yours very sincerely,

HERMANN STREBEL."

Papers Read.

"On Variation in the Radulæ of certain Buccinidæ," by M. V. Lebour.

"West Lancashire Non-Marine Mollusca : Morecambe and district," by H. Beeston.

"Mollusca of Silverdale district," by R. Standen.

"West Suffolk Mollusca," by R. Mayfield.

"*Helicella virgata*," by F. B. Jennings.

"Sinistral *Helicigona arbustorum*," by the Rev. W. A. Shaw.

"*Acanthinula laminata*," by J. W. Jackson.

Exhibits:

By Mr. W. J. Hall : Specimens of *Terebratula biplicata*, Sowerby, from the Rev. A. Dixon's Collection of Cambridge Greensand Fossils, in the Manchester Museum, illustrating marked variations in form between the limits of extreme youth and old age. The gradation is so clearly shown as to prove undoubtedly the accuracy of the specific determination of the series, and suggests that when so-called new species of fossil shells are created, too little attention is devoted to this aspect of the question. Moreover, *T. biplicata* is apparently an ancestral form of several species of *Terebratula* occurring in the succeeding chalk, as well-defined graduated series have been traced between them.

By Mr. T. H. Platt : On behalf of Mr. Thos. Taylor, *Helix aspersa* from Grey-mouth, New Zealand.

By Mr. A. Mayfield : A fine set of West Suffolk Non-Marine Mollusca, to illustrate his paper.

By Mr. R. Standen : Some remarkably large and massive shells of *Limax arborum*, from Armoy, co. Antrim ; *Vitrea glaber* Studer, from Budapest, Hungary (ex. Crosse Collection); and *Segmentina nitida* from Pevensy Marsh, Eastbourne.

By Mr. J. Ray Hardy : *Ancylus fluviatilis*, a curious form taken from the old stone waterpipes of Bath Oolite, which for so long supplied Manchester with water. When these pipes were taken up in Mosley Street, in 1876, numbers of *Ancylus* were found inside them, apparently quite healthy in their dark subterranean abode. The shells are very thick, white, and much elevated, with a solid and somewhat eroded apex, the apical hook overhanging the posterior margin (var. *gibbosa* Bourg.).

347th Meeting, December 13th, 1905.

Mr. Edward Collier (vice-president) in the chair.

Donations to the Library announced and thanks voted :

The usual periodicals received in exchange

Candidates Proposed for Membership.

James R. Plant, M.R.C.S., etc., 107, Hinckley Road, Leicester.

Clement L. Wragge, F.R.G.S., etc., 26, Jasper Road, Upper Norwood, London, S.E.

Resignations.

Dr. J. C. Cox.

John S. Edwards.

Names Struck Off.

It was reported that the following members had been struck off the roll in terms of Rule 3 :

W. D. Crouch.

W. Neville Sturt.

A. Blayney Percival.

Papers Read.

"History of the generic name *Fusus*," by W. H. Dall.

"Nudibranchs from the Indo-Pacific, II.—Notes on *Lophocercus*, *Lobiger*, *Haminæ*, and *Newnesia*," by Sir Charles Eliot, K.C.M.G.

"Christian Hee Hwass, 1731-1803," by G. A. Gosch.

"Observations on an attempt to breed from a Sinistral *Helix pomatia* with notes on the reproduction of the dart," by J. Wilfrid Jackson.

"*Limax tenellus* in Buckinghamshire," by H. Wallis Kew.

"British species of *Vallonia*," by J. E. Cooper.

"Note on *Vitrea cellaria*," by Thos. Edwards.

Exhibits.

By Mr. L. E. Adams: A number of Marine and Non-Marine Shells from Japan; also some toys and rude domestic utensils made of various shells and extensively used by the poorer Japanese. Mr. Adams gave an interesting account of his collecting experiences during a recent visit to Japan.

By Mr. R. Cairns: A fine set of *Euritus veranyi* Pfr., from Santo Domingo, Venezuela; alt. 3,000 ft.

By Mr. T. Edwards: *Vitrea cellaria*, to illustrate his note.

By Mr. W. Moss: A series of species and varieties of *Acavus* from Ceylon; also sets of *Opisthostoma* with enlarged photographs of the shells.

By Mr. C. H. Moore: A number of exotic Pelecypoda.

By Mr. C. Oldham: *Succinea oblonga* from Inchamore, co. Meath, Ireland (per P. H. Grierson, Nov. 16th, 1905), a new county record.

By Mr. W. J. Hall: Shells of *Helix memoralis* thinned down and in some cases worn through during the lives of the occupants by wind-blown sand on the dunes of Horn Head, N.W. Donegal. These form a notable example of "natural sandblast," and were collected by Miss Brittain and forwarded to the Manchester Museum by Mr. R. Welch, of Belfast. Also a series of calcareous deposits received from Mr. Welch, illustrating the origin of some limestone rocks. The series consisted of land, fresh-water, estuarine, and littoral débris, composed of fragments of shells, sea-urchins, foraminifera and calcareous plants. Some of the material had already become consolidated into rock, notably a shelly sand-stone from the bottom of a dried-up pool at Tranarossan, Rosguil, North-west Donegal. Amongst the land shells were *Helix memoralis*, *Helicella itala*, and *Succinea putris*. Amongst the fresh-water *Limnæa stagnalis*, *L. peregra*, *Planorbis spirorbis*, *P. umbilicatus*, *Valvata piscinalis*, *Bithynia tentaculata*, *Paludetrina stagnalis*, and *Sphærium cornutum*. The marine shells consisted of *Mytilus edulis*, *Helcion pellucida*, *Anomia ephippium*, *Gibbula umbilicata*, *Rissoa parva*, *Bittium reticulatum*, *Cardium edule*, *Littorina littorea*, *L. obtusata*, *Purpura lapillus*, and an undetermined species of *Modiolaria*. The calcareous plants included *Chara* and *Melobesia*.

It was decided to hold the following

Special Exhibits at Future Meetings :

January, 1906—The section *Chloræa* of *Cochlostyla*.

February, 1906—White Varieties of British Non-Marine Mollusca.

March, 1906—British Vertiginidæ.

TAPES AUREUS AND ITS ALLIES.

BY A. J. JUKES BROWNE, B.A., F.G.S.

(Read before the Society, May 10th, 1905).

THE attention of this Society has recently been called to some of the species of *Tapes* occurring at Cette, in Southern France. Canon Horsley brought back from there a large number of prettily-marked specimens, and presented a good selection of them to the Manchester Museum, at the same time communicating some notes on them which were published in the April number of the *Journal*.

I am induced to offer some remarks on these specimens and on the species mentioned in his "Notes on *Tapes*," because the Mediterranean forms have passed under so many different names that I think others beside myself must have found it difficult to decide what names, both specific and varietal, should be adopted for the specimens they happen to possess, more especially as to those which are related to *Tapes aureus*.

By the courtesy of Dr. Hoyle, I have been able to examine all the specimens from Cette in the Museum, and I find them to include only two species. There are a number of typical *T. decussatus*, with one example of the variety *intermedia* B.D.D. The specimens referred to *T. aureus* by Canon Horsley are unquestionably the form known as *Tapes texturatus* (Lam.), with many of its colour-varieties, but there is no specimen among them of typical *Tapes aureus* (Gmelin). Nevertheless, his nomenclature can be justified, because some authors consider *T. texturatus* to be only a well-marked Mediterranean variety of *T. aureus*.

There is no intermediate form between *T. decussatus* and *T. texturatus*, as Canon Horsley seems to have understood. The two species are quite isolated from one another, and the name *intermedia* applies only to a form which is intermediate between the Mediterranean and British varieties of the species *T. decussatus*.

Tapes decussatus Linn. need not detain us long. According to Gmelin, Hanley, and Dautzenberg, the type specimens in the collection of Linnæus came from the Mediterranean, and consequently the form there prevalent must be taken as the type. This differs from that common on British and North French coasts in being more regularly oval, less elevated posteriorly, more finely sculptured, and more brightly coloured with variegated browns and greys. Our variety is a more rectangular shell, higher from dorsal to ventral margin, thick and coarsely sculptured with dominant concentric ribs, dull coloured and seldom variegated; this is the variety *fusca* of Gmelin. Messrs.

Bucquoy, Dautzenberg, and Dollfus have, however, described a Mediterranean variety, which has the shape of *fusca* combined with the colouration of the type, and for this they proposed the name *intermedia*.¹

Tapes aureus (Gmelin) is the next species to claim attention. It was based on the figure of an English specimen given by Lister (p. 404, fig. 249), and therefore there can be no doubt about the type, which is the form prevalent in the North Sea and the English Channel. It is a solid, triangularly-oval shell, generally inflated, with prominent umbones, sculptured by strong concentric grooves, which are crossed by obscure and irregular radiating lines. The lunule is defined by an impressed line. The inside is white with a tinge of golden-yellow in the umbonal part of the shell. The muscular impressions are fairly large, and the pallial sinus varies in size but is generally small.

In the typical form, the ventral margin is strongly arcuate, and sometimes sinuous or irregularly curved; from this Jeffreys distinguished a more regularly oval form by the varietal name of *ovata*; and a rhomboid compressed form which he called *quadrata*. In 1893, the authors of "Les Mollusques Marins du Roussillon" described a rugose variety from the Bosphorus under the name of *rugata* (*op. cit.*, vol. 2, p. 426, pl. 63, fig. 7).

Now, let us turn to the Mediterranean forms out of which a number of so-called species have been manufactured, Lamarck being responsible for five at least, and many others having been added by M. Locard. It is not necessary to discuss or even to enumerate all these, since they were all reviewed and grouped by the French conchologists, Messrs. Bucquoy, Dautzenberg, and Dollfus, in their excellent memoir on the Marine Molluscs of Roussillon (vol 2, p. 414, *et seq.*). It seems best, therefore, to give first a resumé of the opinions held by these authors in 1893, and at the same time to indicate how far they have since been modified, according to information for which I am indebted to M. Dautzenberg. Afterwards I will state my own views on the subject of the specific value of their groups.

In the work above mentioned all the cognate forms are grouped under the specific name of *Tapes aureus*, and the authors describe this as a polymorphic species, among the various forms of which they distinguish "five principal varieties round each of which numerous variations of secondary importance may be grouped." In point of fact they recognise one specific type and four sub-species, though they do not use these terms of nomenclature. Their five principal varieties are:—

1 "Les Mollusques Marins du Roussillon," vol. 2, p. 436, pl. 65, fig. 5, 1893.

Tapes aureus Gmelin, typical form.

„ „ var. *catenifera* Lam.

„ „ var. *texturata* Lam.

„ „ var. *pulchella* Lam.

„ „ var. *elongata* B.D.D.

There can be no doubt that the second and third of these names represent distinct natural groups which deserve to be distinguished by special names, whether we regard them as species or only subspecies, and that the last two are also well-marked forms. They may be considered in the order above given.

1.—**Tapes catenifer**, or *Tapes aureus* var. *catenifera*, is smaller than typical *T. aureus*, its average length being from 24 to 28 mm., while that of *T. aureus* is from 26 to 32 mm., and sometimes up to 40 mm. The shell is oval and often elongate-oval, less convex than *T. aureus*, and its substance much thinner. The concentric striation is finer and more regular and the radiating lines are obsolete or very faintly marked. Inside the colour is usually yellow or yellowish-white, but sometimes violet or purple. The muscular impressions are small, and the pallial sinus larger than in *T. aureus*.

Under this head are placed the forms named by Lamarck *florida*, *bicolor*, and *petalina*, the first differing little from the type, the second being whitish with a blotch of brown on the posterior side, and the third being of a violet colour inside and darkly variegated outside. These are merely colour-variations, but the authors recognise two shape-varieties, viz., *bourguignati* (Locard), which is much elongated posteriorly, and *grangeri* (Locard), which is regarded as a connecting-link with the next form *T. texturatus*, being larger and higher.

2.—**Tapes texturatus**. This is a larger shell, averaging 35 to 40 mm. in length, broadly and regularly oval, but generally more or less compressed. The concentric grooving is very fine, and the surface of the shell is always glossy and glistening, as well as being usually brightly coloured. In texture, it is very thin and brittle, thus contrasting strongly with the shell of *T. aureus*. Inside it is either white, yellow, or purple, according to the external colour-variations. The muscular impressions are of moderate size but shallow, and the pallial sinus is not proportionately so large as in *T. catenifer*.

In this group, the authors of the "Mollusques du Roussillon" placed the *T. florida* of Reeve (*non* Lam.), the *floridella* of Lam., *mabiliei*, *rostratus*, *nitidosus*, and *retortus* of Locard, besides *radiatus*, *luteus*, and other colour-varieties. M. Dautzenberg, however, has kindly informed me that he now excludes the *Venus floridella* of Lamarck, because, having examined the type, he finds that to be an

exotic shell, but Locard has described a form under this name which appears to be a purplish variety of *T. texturatus*.¹ The varieties *mabiliei* and *nitidosa* are more inflated than the type, *rostrata* is more oblique, *retorta* oblique, short, and high, resembling *T. aureus* in shape but having the other characters of *texturatus*.

3.—**Tapes pulchellus.** With regard to the form called *Tapes pulchellus*, M. Dautzenberg informs me that the type does not exist at Geneva, but that the figures given by Delessert of Lamarck's type in 1841 have more resemblance to a form of *T. rhomboides* (= *virginicus*), and he consequently would now exclude *pulchellus* from the *aureus* group. To this I may add that Delessert's figure appears to have been copied by Hanley in his "Catalogue of Recent Bivalve Shells" (pl. 13, fig. 39, 1843), and that its resemblance to what we know as *T. virginicus* is so great that I had so regarded it before becoming aware of M. Dautzenberg's opinion.

4.—**Tapes elongatus.** Lastly, we come to the form described under the name of *Tapes aureus* var. *elongata*,² which is a local form found in the Gulf of Gabes, on the east coast of Tunis. It is a long, narrow, compressed shell, finely striated and glistening, of a light yellow or pink colour, either uniform in tint or with faint colour-tracery on the posterior part. In length it averages from 35 to 40 mm. To judge from a specimen which M. Dautzenberg has kindly sent me, the shell is fairly stout, like that of *T. rhomboides* and *T. aureus*; the lunule is not defined by an impressed line as in the latter, but resembles that of the former, so that it seems to me rather more nearly allied to *rhomboides* than it is to *aureus*.

Before going further, it is necessary to say a few words on the names adopted for these main varieties or species. The form for which the name *catenifer* was adopted by Messrs. Bucquoy, Dautzenberg, and Dollfus is acknowledged to be the *Venus læta* of Poli (1795), and this name has priority over any of the Lamarckian names, but unfortunately it had previously been applied to another *Venus* by Linnæus. It is true that *Venus læta* Linn. is a *Meretrix*, and *Venus læta* Poli is a *Tapes*, so that no confusion could arise if Poli's name were revived for the latter; but many conchologists adhere to the principle of "once a synonym always a synonym," and the authors of the "Molluscs of Roussillon" are evidently of this opinion, for they reject the name of *lætus* and adopt that of *catenifer* for this group. The name of *floridus* stands first in Lamarck's list, and he intended this for Poli's type, but this also was a synonym, Poli himself having

1 *Bull. Soc. Malac. de France*, vol. 3, p. 283, 1886, and "Coq. Marines des côtes de France," p. 294, 1892. It may be the *T. floridella* of Reeve, "Conch. Icon."

2 "Moll. Mar. du Roussillon," vol. 2, p. 429, pl. 64, figs. 11, 12, 13.

described a *Venus florida*. It must be remembered, therefore, that the name *Tapes catenifer* stands for *T. letus* (Poli) and *T. floridus* (Lam.).

The name *texturatus* has also been considered by Hanley and others of doubtful application, because Lamarck gave for the locality of his type the "Indian Ocean." On the other hand, he cites Chemnitz, "Conch. Cab.," fig. 443, as an illustration of the species *texturatus*, and this figure is stated to be clearly meant for the Mediterranean species. Nearly all subsequent authors have assumed that the name really belongs to the Mediterranean shell, and M. Dautzenberg informs me that he has examined Lamarck's types at Geneva, and has satisfied himself that the three specimens labelled "*Venus texturata*" in Lamarck's handwriting are specimens of this shell; so that there seems to be no doubt about the proper application of the name.

There remains only the question of the value of the groups to which these and the other names are attached. M. Locard has recognised no fewer than twenty-six different species of *Tapes* on the French coast; M. Dautzenberg, on the other hand, thinks that it is better "to group under one name all forms between which it is easy to find many intermediate links" (*op. cit.*, p. 396). English conchologists will quite agree with him that mere variations of outline and colour are not of specific importance in the genus *Tapes*, and that we must have regard to the "ensemble des caractères." It is the old story of "splitting" and "lumping," and the question resolves itself into one of scientific proportion and convenience. I strongly dissent from minute splitting, but I am inclined to think that the principle of combining all the forms which can be connected by intermediate variations may be carried so far as to become inconvenient. Binomial nomenclature is itself a matter of convenience, and if we group too much it becomes trinomial or quadrimomial, for well marked local varieties must have a name.

I think the present case is eminently one in which the *via media* is the most satisfactory and convenient course. I should contend that the mere fact of two polymorphic specific groups being connected by some local intermediate forms is not sufficient to prevent our regarding both of them as species. Modern naturalists believe that all closely-allied forms have been developed from one common ancestor. In this process of development some of the mutations which formed links between some of the persisting varieties may also have persisted, others may have died out; in the one case we have species that are more or less linked to one another by intermediate varieties, in the other we have isolated species; but the latter may not differ more

from the types of the connected species than these do from one another.

It seems to me that we have an illustration of this in the case of *Tapes rhomboides* (= *virgineus* Auct.) and the *T. aureus* group. The former differs from the latter chiefly in its rhomboidal shape, in having fewer concentric grooves, and a less defined lunule. Now it appears to me that a typical *T. texturatus* differs quite as much from *T. aureus* as the latter does from *T. rhomboides*; and that if the last is regarded as a good distinct species, so also should *texturatus* and *catenifer* in spite of the links which connect them with *aureus*.

I am not sure, however, that *T. rhomboides* is an isolated species. Like *T. aureus*, it is local in the Mediterranean, but the var. *pulchella* has by some authors been grouped under *T. aureus*, and must therefore be a kind of link between them. Again, the author of *T. elongatus* places it under *T. aureus*, but it has almost as much resemblance to *T. rhomboides*.

I should, therefore, arrange the species above mentioned and their principal varieties as follows:—

1. *Tapes rhomboides* Penn., with vars. *curta* and *pulchella*.
- 2.? *Tapes elongatus* B.D.D.
3. *Tapes aureus* Gmelin, with vars. *ovata*, *quadrata*, and *rugata*.
4. *Tapes catenifer* Lam., with vars. *bicolor*, *petalina*, *bourguignati*, *grangeri*, and others.
5. *Tapes texturatus* Lam., with vars. *mabillei*, *nitidosa*, *rostrata*, *retorta*, and others.

The history of this group of species seems to be that they all sprang from a common ancestor in Miocene times, that they became differentiated in early Pliocene times. *T. rhomboides* and *T. aureus* seem to have attained their chief development in the colder seas; both are found fossil in the newer Pliocenes of England, and exist now in the North Sea and on the coasts of the Atlantic as far south as the Straits of Gibraltar. It is an interesting fact that *T. aureus* is very rare in the western basin of the Mediterranean, but exists in the eastern basin. M. Dautzenberg informs me that he has a specimen from Venice and three typical specimens from Greece, besides the variety from the Bosphorus; according to Middendorf, it also exists in the Black Sea. *Tapes rhomboides* seems to have been more abundant in the Mediterranean area during Pliocene times than it is now in that sea, having been recorded from the Pliocene deposits of Italy, Sicily, Rhodes, and Cos. On the other hand, *Tapes aureus* does not seem to occur in these deposits.

As *T. elongatus* is also confined to the eastern basin of the Mediterranean, one may infer that it has been developed from one of these

two forms, and I am inclined to regard it as having originated from *T. rhomboides* rather than *T. aureus*. The probability of this will be increased if it should prove that *T. aureus* is a comparatively recent immigrant.

Tapes texturatus and *T. catenifer*, on the other hand, appear to have been developed in the Mediterranean, though it is not quite certain whether *T. catenifer* did not also at one time exist on Atlantic coasts. *T. texturatus* certainly does not seem to exist outside the Mediterranean, but M. Dautzenberg has sent me a shell from St. Lunaire, near St. Malo, which seems to form a link between *T. catenifer* and *T. aureus*. It may be described as a thin-shelled and finely-grooved form of the ovate variety of *T. aureus*. It has the inflated form of *aureus*, and may be regarded as a variety evolved during the differentiation of *aureus* and *catenifer*, and consequently as a link between them.

T. texturatus has been quoted from the Walton Crag, but with much doubt. Only one specimen was known to Searles Wood and figured by him in his "Crag Mollusca."¹ He admits, however, that the form of the shell is somewhat different and that the lunule is not so distinctly marked, consequently he only "assigns it provisionally to what appears its nearest representative." By the kindness of Mr. F. W. Harmer, I have been allowed to examine a nearly perfect specimen and several fragments which he obtained from the Walton Crag at Oakley and believes to be the same shell. I have compared them with many specimens of the recent species, and think they come quite as near to *T. catenifer* as to *T. texturatus*. The perfect fossil is regularly oval, much compressed, and very finely grooved, with a longer and straighter dorsal margin than *T. texturatus* usually has, and it is less produced in front. It might well receive a special varietal name.

T. texturatus has even been separately entered in a list of British Pliocene fossils, as a living British shell, merely because Jeffreys and others regarded it as a variety of *T. aureus*, and thus the real geographical distribution of the species has been misrepresented because the two have not always been recognised as distinct species.



Hygromia rufescens (Penn.) m. **sinistrorsum**.—On May 27th last, at East Haddon, North Hants, some school children shewed me a congregation of *Hygromia rufescens* under some trampled nettles, one fell on my hand and I found it was a nearly full-grown sinistral specimen. As this form is, I believe, new to Britain, if indeed it is known at all, the find makes an interesting new record.—[Rev.] W. A. SHAW, Haselbeech Rectory, North Hants (*Read before the Society*, June 21st, 1905).

ON VARIATION IN THE RADULÆ OF CERTAIN BUCCINIDÆ.

BY M. V. LEBOUR, B.Sc.

(Read before the Society, November 8th, 1905).

PLATE VI.

VARIATION in the radula is by no means uncommon in Gastropods. This has been chiefly investigated in *Buccinum* and its allied genera, many species being easily obtainable. The organ in these cases is simple and large enough to be readily seen, consisting of a long ribbon bearing many rows of chitinous teeth. In the Buccinidæ, Fascioliidæ, and others, there is a central plate and one lateral on each side, and these are divided into teeth, which are usually regular throughout the radula. It is the number of these teeth which varies very considerably, both in centrals and laterals, but in the former much more frequently than in the latter.

Bateson, in his "Materials for the Study of Variation," p. 262, draws attention to Friele's work on *Buccinum*, and also refers to information given him by the Rev. A. H. Cooke on this subject. Friele has worked thoroughly on the radula of the Norwegian species of the genus *Buccinum* (*Jahrb. Deutsch. Mal. Ges.*, vol. 6, p. 257, 1879). In a most elaborate paper he shows how enormously the radula of *Buccinum undatum* varies, and also, in a similar way, other species of the same genus. He regards the radula as of little value for the identification of species in comparison with external characters; closely-allied species, or what authorities have taken to be separate species, not presenting definite differences in the radula. Even in what we take to be distinct genera, we find sometimes that the forms of the radulæ merge into each other. For instance, the typical radula in *Buccinum undatum* has in each row a central plate bearing six teeth and a lateral plate on each side bearing four teeth. The typical form of *Neptunea antiqua* has a central plate bearing three teeth and a lateral plate on each side bearing three teeth. Now, Bateson gives in his notes above mentioned a figure of a radula of *Buccinum undatum*, from Labrador, from the collection of the Rev. A. H. Cooke, having three centrals and three laterals on each side throughout, these showing the same form as the typical *Neptunea antiqua*. This certainly is a very unusual specimen, although *Buccinum* is extremely variable.

Having had exceptional opportunities in the laboratory of Armstrong College, Newcastle-upon-Tyne, of examining the radulæ of *Buccinum undatum*, *Neptunea antiqua*, and (with fewer specimens) *Volutopsis norvegicus*, and *Buccinofusus berniciensis*, I think the results

may be of some interest, although they go over much the same ground that Friele has already investigated so thoroughly, both in the above-mentioned paper and in the "Norske Nordhavs Expedition," his illustrations in both papers being most profuse. I have not here figured any radulæ of the genus *Buccinum*.

As was to be expected, there appears to be no correlation of variation with regard to the shell and the radula. Forty-eight specimens of *Buccinum undatum* from the North Sea, eighty miles E. by N. of the river Tyne, were examined; thirty female and eighteen male. Twenty-three of these had a normal radula (*i.e.*, laterals four, centrals six), seventeen of which were females. The other twenty-five varied as follows:—

Centrals.		Laterals.		Number of Specimens.
7	-	4	-	13 (4 ♂, 9 ♀).
4½	-	4	-	1 ♂.
4½ and 4	-	5 and 2	-	1 ♂.
7	-	4 and 3	-	1 ♂.
8	-	4	-	2 (1 ♂ and 1 ♀).
6	{	4 and 3	}	1 ♂.
	{	and a small lobe	}	
5	-	4	-	4 (2 ♂ and 2 ♀).
6	-	4 and 3	-	1 ♂.
5	-	5 and 4	-	1 ♂.
6	-	4 and 6	-	1 ♂.

Out of ninety-six specimens of *Buccinum undatum* from 120-130 miles E. by N. of the river Tyne, forty had a normal radula, seventeen of which were female. The remaining fifty-six varied as follows:

Centrals.		Laterals.			Number of Specimens.
		Left.	Right.		
7	-	4	4	-	28 (20 ♀, 8 ♂).
5	-	4	4	-	9 (5 ♀, 4 ♂).
8	-	4	4	-	4 (1 ♀, 3 ♂).
6	-	3	3	-	1 ♀.
7	-	6	6	-	1 ♀.
6	-	6	4	-	3 (1 ♀, 2 ♂).
7	-	5	5	-	3 (2 ♀, 1 ♂).
6	-	4	6	-	5 (2 ♀, 3 ♂).
3	-	5	5	-	1 ♂.
(1 monstrous).					
7	-	5	4	-	1 ♂.

From these numbers it will be seen that about 43 per cent. only are normal. The females do not vary so much as the males, and chiefly only in the centrals. The most frequent variation is seven centrals instead of six; indeed, so common is this that Gray regarded

this form as typical ("Guide to Mollusca," part 1). The females show more regularity, only three out of fifteen specimens with irregular laterals being female. Out of nine specimens with irregular laterals five varied on the right side and four on the left. The above results agree fairly well with Friele's numbers. I give one of his tables for comparison :

"In twenty-seven specimens from Hammerfest and Vardö, the teeth were as follows (*Jahrb. Deutsch. Mal. Ges.*, vol. 6, p. 257, 1879):

Central Plate.		Lateral Plate.		Cases.
5	-	4	-	8
6	-	4	-	12
7	-	4	-	2
6-8	-	4	-	1
9	-	4	-	1
6	-	3 and 4	-	1
7	-	3 and 4	-	1
8	-	4 and 5	-	1

It is thus seen that there may be as many as nine central teeth and as few as three; in the one case in which I found three centrals, one of the outside teeth was quite monstrous. There may be as many as six laterals and as few as two. In many cases these are small knobs showing a tendency to multiply lobes. In most cases the variation continues throughout the radula. Troschel ("Gebiss der Schnecken") expresses great surprise at a specimen having six central teeth in front and five at the back, and, as is seen from the above table, Friele found one from Hammerfest having six in front and eight at the back. Two of my specimens were irregular in this way; one had seven centrals throughout and four laterals on one side, but the other side had three teeth for thirty rows and then a very small fourth for three rows, then three again and so on very irregularly. In the second specimen the irregularity was in the centrals and in one side. On one side were five laterals throughout, and on the other there were two and a very small third for thirty-one rows and then only two. The centrals were four and a small knob for five rows, then only four for three rows and so on.

The variations in *Neptunea antiqua* were much the same as those found in *Buccinum undatum*. Thirty-two specimens from 120-130 miles E. by N. of the river Tyne were examined. They were all much alike, large, with thick shells, and deep yellow inside. Twenty-eight were female, and four male; the females appear to congregate together. Fourteen radulæ, thirteen of which were female, were normal, that is to say, they had three laterals on each side and three centrals. The other eighteen varied as follows :—

Centrals.	Laterals.		Number of Specimens.
	Left.	Right.	
2	-	3	5 ♀.
4	-	3	3 ♀.
1	-	3	1 ♀.
3	-	4	2 (1 ♀, 1 ♂).
3	-	3	2 ♀.
3	-	6	1 ♀.
2	-	4	1 ♀.
2	-	3	1 ♂.
3	-	5	1 ♀.
3	-	3	1 ♂.

(1 bilobed).

In eight specimens, all female, from Berwick-on-Tweed, four were normal, the others varied thus :—

Centrals.	Laterals.		Number of Specimens.
5	-	3	2
2	-	3	1
(1 bilobed).			
4	-	3	1

We see from these tables that although about 43 per cent. are normal, yet there is really more variation in this species than in *Buccinum undatum*, for if we counted as normal those specimens of *Buccinum* which have seven centrals, there would be a much smaller per-centage of variations. There may be as many as five centrals and as few as one in *Neptunea antiqua*, and there may be six laterals, but I have not found less than three. The same tendency to multiply lobes is found in this species, and although most are regular throughout, yet one shows a curious irregularity (fig. 6); it is normal all through except one tooth, which bears two minute extra lobes. Another (fig. 11) has very irregular laterals on the right side, near the front they are almost normal, with a small extra lobe, but gradually become monstrous with six irregular teeth. So far as can be seen from so few examples, the side variations are about equally distributed on the left and right side.

Ten specimens of *Volutopsis norvegicus* were examined. These were obtained with *Buccinum undatum* and *Neptunea antiqua* from the North Sea, 120-130 miles E. by N. of the river Tyne. There were eight female and two male; seven females were alike in the radula, having two teeth to each lateral plate and four to the central. This we may suppose to be the typical form. One female and two males had five centrals, and one male had a small accessory tooth between the two normal teeth of the right lateral plate, and a bilobed fourth central on the left side, thus showing a tendency to increase the number of teeth, as in *Buccinum* and *Neptunea*.

Four specimens of *Buccinofusus berniciensis*, which were with the *Volutopsis*, were examined; two male and two female, each radula was different, and varied in the following way:—

Centrals.		Laterals.			Number of Specimens.
		Left.	Right.		
I	-	12	9	-	1 ♂.
I	-	13	11	-	1 ♀.
1 & 2 small lobes	-	7	6	-	1 ♀.
I	-	9	9	-	1 ♂.

Two radulæ, also from the North Sea, kindly lent me by Mr. Joseph Wright, of the Hancock Museum, Newcastle-upon-Tyne, were also examined; they were as follows:—

Centrals.	Laterals.
I	- 8 right, 7 left.
I	- 9 left, 10 right.

From these numbers this species appears to be exceedingly irregular as to its radula, and it is impossible to say which is the normal form from so few examples. Only one has the laterals the same both sides. As this is one of our rare British shells, it is difficult to get many specimens; even to find four together is unusual good fortune.

I have to thank Mr. A. Meek, M.Sc., for providing me with the excellent supply of specimens which enabled me to make these observations.

Destruction of Potatoes by Slugs.—Whilst staying at Stour Provost, in North Dorset, last September, I was asked to examine a large bed of potatoes, said to be "diseased." The crop which had been dug out the preceding day was a fairly good one, and many of the tubers were very large. A large number of the potatoes were studded with holes, large and small, and the skin around the apertures was shrivelled and darkened. That slugs were responsible for the damaged crop was quickly apparent. They had attacked the tubers to such an extent that many were honeycombed throughout, and in section resembled a bath sponge. The slugs were of three species, viz.: *Milax sowerbyi*, *Agriolimax agrestis*, and *Arion hortensis*, the last being by far the most abundant. As far as we could judge the potatoes were quite free from the *Phytophthora infestans*, De Bary. The variety was unknown. Of course, it is well known that slugs will eat potatoes, but I think it is of rare occurrence to find wholesale destruction of a crop in the manner indicated. Many gardeners visiting the Haselmere Educational Museum have remarked to me that slugs have been unusually abundant during the past spring and summer.—E. W. SWANTON (*Read before the Society*, November 9th, 1904).

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Iconographia Molluscorum Fossilium in Tellure Tertiaria Hungariae, Croatiae, Slavoniae, Dalmatiae, Bosniae, Herzegovinae, Serbiae et Bulgariae Inventorium, by SPIRIDION BRUSINA. Atlas Folio; Zagreb (Agram) Croatia, 1902.

The compiler of this work, Professor Brusina, director of the National Museum of Croatia, has for many years made a special study of the malacological fauna which characterizes the Neogene or Mio-Pliocene deposits of South-eastern Europe. He has issued a large number of memoirs upon the subject, usually well illustrated, and has thus rendered most important services to this branch of Palæontology, the value of which either to the student or the systematist is very generally recognized. According to an announcement on the title-page, this "Iconographia" forms a continuation of the author's Monograph of 1897, called "Matériaux pour la Faune Malacologique Néogène de la Dalmatie, de la Croatie, et de la Slavonie avec des espèces de la Bosnie, de l'Herzegovine et de la Serbie," a work which is very necessary to consult, since it gives geological information respecting the various beds of the Neogene series and their shell contents, which is not repeated in the present book. It is, therefore, necessary to explain here that the Neogene Mollusca of this region of Europe are of lacustrine and fluvial origin, having formerly inhabited a series of brackish-water lakes, which extended from the eastern boundary of the Adriatic Sea to the shores of the Caspian. In fact, the existing faunas of the Black Sea, the Aral, the Caspian, and other neighbouring inland waters are supposed to represent the remnants of the once prolific life of the Neogene period. In this area of Europe the Neogene deposits are divisible into the Pontian and Levantine or Plaisancian stages, which are respectively equivalent to the Uppermost Miocene and the Lowest Pliocene. A leading Lamellibranch genus of the Pontian beds is *Congerina*, hence such deposits are known by the German geologists as "Congerien-Schichten"; whereas the Levantine beds are characterised by the great abundance of *Viviparus* (or *Paludina*), and have, therefore, been termed "Paludinen-Schichten." Coming to the work itself, we find it to consist of 1,582 lithographic figures, occupying 30 folio plates. These illustrations represent 424 species and sub-species, 46 undeterminable forms, and 190 entirely new shells, to which new specific names have been attached. Beyond a small Latin preface referring to the scope of the work, there is no descriptive text of the specimens figured, nor, as before observed, is there any intimation of the horizontal value of each species—only the genus, species, and its author, and locality, are given. With regard to the new specific names that are introduced, it is quite certain that Palæontologists will be unable to recognize them until such time as the shells to which they refer are systematically described. The plates, however, are well executed, and as a reference work to the Neogene Mollusca of this region of Europe it is indispensable to the student.—R.B.N.

Nachrichtsblatt der Deutschen Malakozoologischen Gesellschaft, 1905, pts. 3, 4, July-December, 1905.

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The Nautilus, vol. 19. nos. 1-5, May-September, 1905.

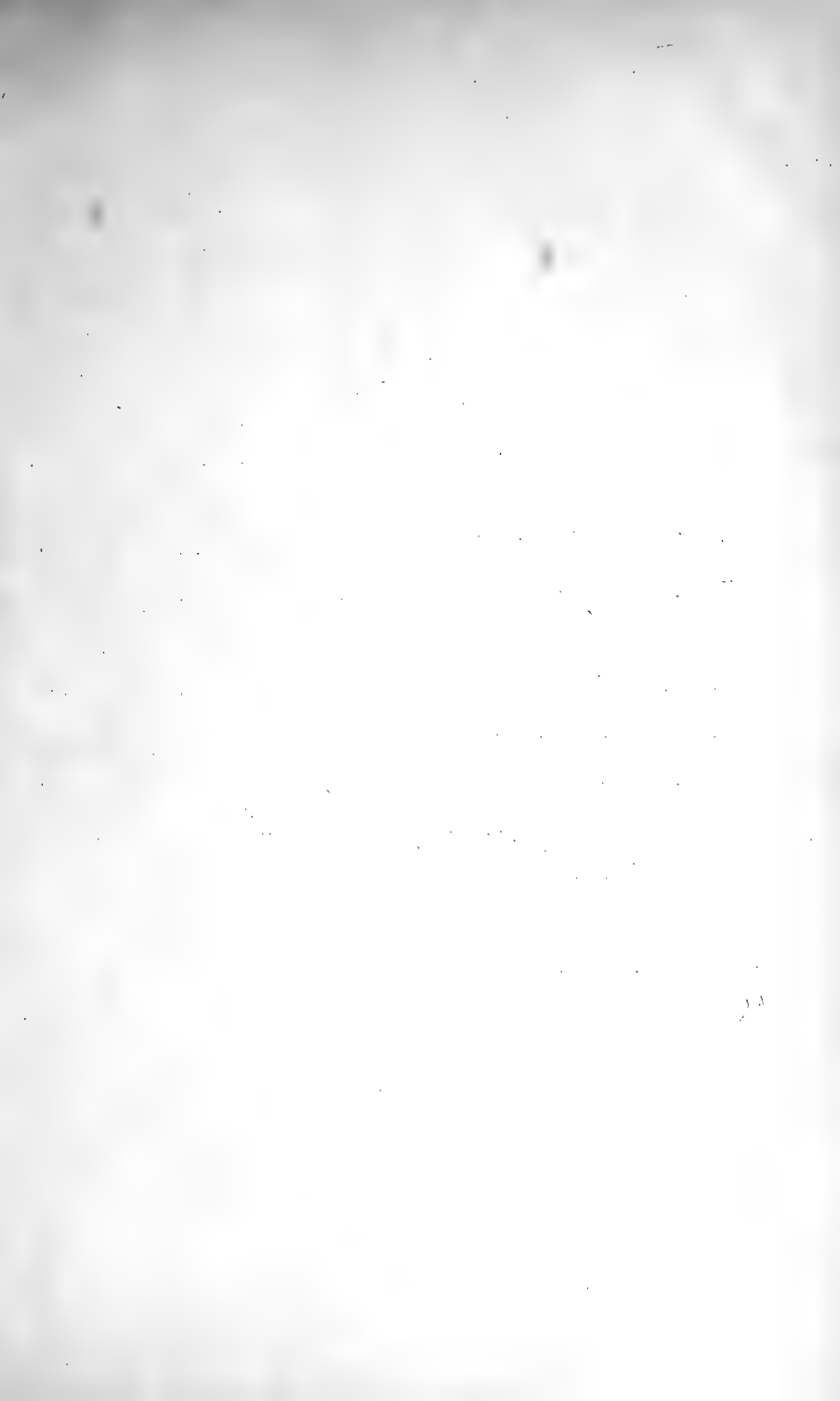
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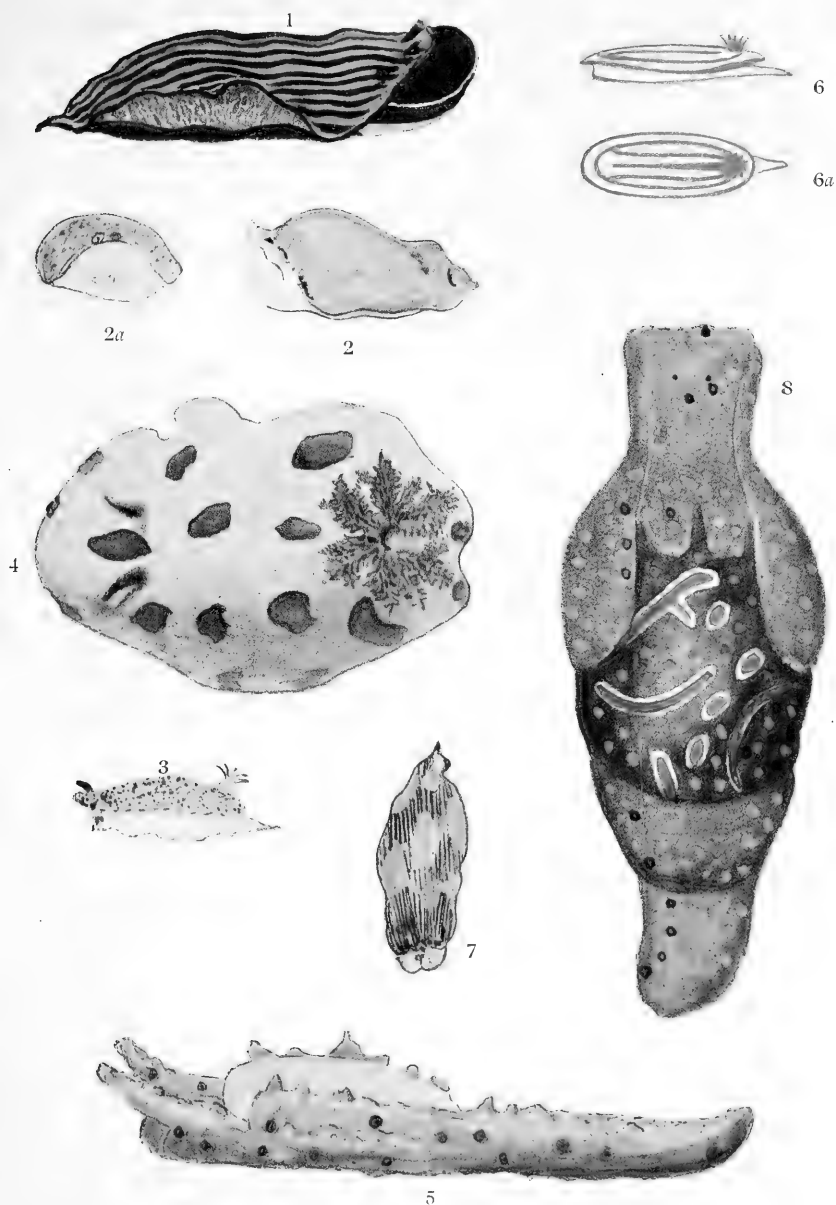
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EXPLANATION OF PLATE V.

1.	<i>Pleurophyllidia taeniolata Bergh</i>	Page 239
2, 2a.	<i>Linguella sarasinica Bergh</i>	„ 240
3.	<i>Chromodoris sannio Bergh</i>	...	...	...	„ 248
4.	<i>Platydoris townsendi sp. nov.</i>	...	...	...	„ 253
5.	<i>Lophocercus viridis Pease</i>	...	...	...	„ 301
6, 6a.	<i>Chromodoris pusilla Bergh</i>	...	...	...	„ 249
7.	<i>Pleurophyllidia semperi Bergh</i>	...	...	...	„ 238
8.	<i>Haminæa simillima Pease</i>	...	...	...	„ 310

Figs. 5 and 8 are from drawings by Mr. CYRIL CROSSLAND,
the rest from drawings by Mr. F. W. TOWNSEND.



NUDIBRANCHS FROM THE INDO-PACIFIC.



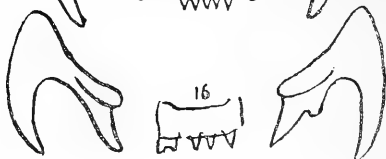
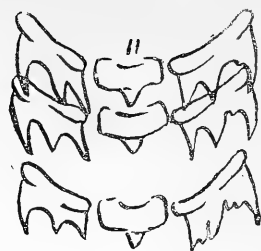
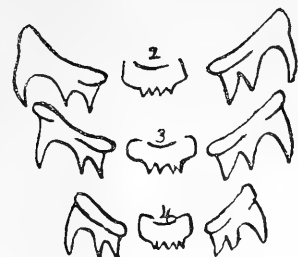
EXPLANATION OF PLATE 6.

The figures (with the exception of fig. 19) are tracings from photomicrographs. Fig. 1 shows the normal radula of *Neptunea antiqua*, and fig. 14 that of *Volutopsis norvegicus* respectively. The rest are varieties.

Figs. 1 to 13.—*Neptunea antiqua*.

Figs. 14 to 16.—*Volutopsis norvegicus*.

Figs. 17 to 19.—*Buccinofusus berniciensis*.



RADULÆ OF BUCCINIDÆ.

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No. 10.

EARLY HISTORY OF THE GENERIC NAME FUSUS.

BY WILLIAM HEALEY DALL.

(Read before the Society, December 13th, 1905).

THE name *Fusus* in conchology, though doubtless long in use colloquially for spindle-shaped shells, appears to have been first introduced into literature and used systematically by Rumphius, in 1705, in his "Amboinische Rariteit Kammer," where the name appears as a subdivision of *Buccinum*, to which are referred two species from Amboyna, identified by von Martens as *Fusus forceps* Perry and *F. nobilis* Reeve, represented on Rumphius' plate 29, figs. F. and G.

Klein, in 1753, used the name for a heterogeneous assembly, a subdivision of his class of "*Cochlis rostrata*," excluding *Rostellaria* and *Megalatractus*, and including the species mentioned by Rumphius together with species of *Pleurotoma*, *Latirus*, *Fasciolaria*, *Melongena*, *Tritonidea*, and *Pusionella*, as well as a number of species of Lamarckian *Fusus*.

In 1766 P. L. S. Müller published an edition of Knorr's *Delicie Nature Selecte*, in two volumes, folio, with text in parallel columns, of German and French. The text, as in the original edition of 1754, is frankly polynomial, and the system of arrangement resembles that of Argenville (p. 34), and is followed by an explanation of the plates, of which only page 129 is devoted to the shells, for which are cited chiefly the appellations given by Rumphius. Many of these, it will be remembered, are composed of two words. But the mere citation of the accidentally binomial name of a prelinnean author, is something very different from incorporating it into the Linnean nomenclature. Hence the occurrence of Rumphius' names composed of one or two Latin words in the explanation of the plates of a book like this of

Müller, in which the Linnean system of nomenclature is not anywhere adopted, does not give those names any standing. Therefore, the occurrence of *Fusus brevis* Müller ex Rumphius, and *Turris babylonica* Müller ex Rumphius, has here merely an historic interest. As a matter of fact, Müller has misapplied Rumphius' name to *Hemifusus morio* L., when it was originally given to a true *Fusus* in the Lamarckian sense.

A conglomeration similar to that of Klein was called *Fusus* by Martini, in 1773, in the Catalogue of his Collection, and in 1777 the group was placed as a subdivision of *Buccinum* in the third volume of his "Conchylien-Cabinet." His example was followed by Schröter in 1784. Argenville and Favanne did not use the name *Fusus*, but referred to the species as *Buccina*, as did Meuschen in 1787. Gualtieri preferred *Strombus*. Favart d'Herbigny, in his Dictionary of Natural History of *Testacea* (1775) uses *Fusus* for a number of the Rumphian *Fusi*, but reserves the term '*Fusus proprius dictus*' for a species of *Rostellaria*.

This perhaps is as much as need be said for the non-binomial writers, though I may point out in passing, that several of these names, and of names in a similar case, in the 1789 reissue of Bröwne's "History of Jamaica," have found their way into the recently-published Index Animalium, where among genuine binomial names they are manifest intruders.

The history of the name *Fusus* under the Linnean system of nomenclature is as follows:—

Linné in 1758 included in the subdivision "*Caudigeri*" of his genus *Murex*:—*Rostellaria*, *Pleurotoma*, *Fusus*, *Melongena*, *Megalatractus*, *Trophon*, *Busycon*, *Chrysodomus*, *Septa*, *Fusciolaria*, *Pusionella*, *Euthria*, etc.—perhaps the most indiscriminating hotchpotch on record for a single group of shells. The twelfth edition, 1768, made things, if possible, a little worse by the addition of *Melanopsis* and *Tudicla*, while Gmelin, in 1792, adds to the number of species without improving on their classification.

So far as I have been able to discover, and also according to Sherborn in the "Index Animalium," the first binomial writer to use *Fusus* in accordance with Linnean nomenclature, and to eliminate from the heterogeneous assembly of Linné a group under that name, was Helbling,¹ who published a collection of miscellaneous shell-notes, under the title "Beiträge zur Kenntniss neuer und seltener Conchylien," in 1779. In this paper the name *Fusus* appears in sub-generic form as follows:—

¹ Abhandl. einer Privatgesellschaft in Böhmen zur Aufnahme der Mathematik, der vaterländischen Geschichte und der Naturgeschichte, vol. 4, pp. 102-131, pl. i.-iii., Prag, 1779; see also von Martens, *Malak. Blätt.*, vol. 16, pp. 234-236, Dec., 1869.

1. *Murex (Fusus) granosus*. *Op. cit.*, p. 116, pl. 2, fig. 16 (= *Pleurotoma kieneri* Doumet, *Mag. Zool. [Guérin]*, 1840, pl. 10).
2. *Murex (Fusus) vibicinus*. *Op. cit.*, p. 117, pl. 2, fig. 23 (= *Pleurotoma interrupta* Lamarck).
3. *Murex (Fusus) polytropus*. *Op. cit.*, p. 119, pl. 2, figs. 24-25 (= *Pleurotoma deshayesii* Doumet, *Mag. Zool.*, 1840, pl. 11).
4. *Murex (Fusus) intertextus*. *Op. cit.*, p. 120, pl. 2, figs. 26-27 (= *Tritonium reticulatum* Blainville, Mediterranean).

Passing over for the moment the effect of this state of affairs on nomenclature, we may note the subsequent contributions of authors to the literature of the subject, previous to the publication of the Mollusks of Lamarck's "Animaux sans Vertébrés," 1818-1822.

Linné had named a *Rostellaria* "*Strombus fusus*." It was not surprising, therefore, that this shell should be regarded by collectors as the typical spindle shell, nor that the author of the anonymous "Museum Calonnianum" (1797) should have reserved the name *Fusus* for two varieties of this Linnean shell and for them alone. In the same work the genus *Fusus* is preceded by a genus *Colus*, containing only one identifiable species, *Murex colus* Linné, and this follows a genus *Turris*. Under *Turris* all the species are nude names, but one of them, *T. babylonica*, has been identified traditionally with the *Turris babylonica* of Rumphius and Müller's "Knorr," a shell which later became the type of Lamarck's genus *Pleurotoma*.

In 1789, in the "Encyclopédie Méthodique," p. 15, in the "Tableau Systématique des Vers," Bruguière has the following entry:—

"Genre 45. FUSEAU. *Fusus*. *Coquille fusiforme sans varices, terminée à la base par un canal étroit, droit, ou recourbé.*"

No type or species is mentioned, and it is obvious that the name might be applied on the basis of the diagnosis to any fusiform, non-varicose, canaliferous gastropod. No further data were furnished by Bruguière, and it was only some twenty-six years later that the plates of the "Encyclopédie," containing species of *Fusus*, were published by Lamarck, who had altered and improved the classification of his predecessor, so that it cannot be recognized as Bruguière's.

However, in 1798, Cuvier,¹ cites as examples of Bruguière's genus (which he regards as a subdivision of *Murex*) the *Murex fusus* Linné, 1758, and *Murex colus* L., which are equivalent to *Rostellaria* and *Fusus* of Lamarck's "Prodrome" of the following year.

Of the shells which were generally grouped about *Murex colus* Linné, we find in 1798 a large number included by Bolten in a new genus, *Neptunea*.² *Colus* is used by him for a series which begins with

¹ "Tableau Elém," p. 403.

² "Museum Boltenianum," pp. 115-116, 1798.

Fasciolaria tulipa and includes *Murex islandicus* Gmelin, a *Euthria* (?) and a *Mazzalina* (?). Bolten's *Fusus* follows. It begins with *Fasciolaria trapezium* and includes *Latirus* in the first section which has a plaited pillar; the second section with a smooth pillar is made to include *Murex tuba*, *M. ternatanus*, *M. morio*, *M. æthiops*, *M. vesperilio*, and *M. marroccanus* of Gmelin. The *Colus* group, including the great *Murex aruanus* Gmelin, is called *Syrinx* (not of Bohadsch, 1761), while for the *Gladius* of Klein, the *Fusus* of the "Museum Calonnianum," the name *Tibia* is proposed. Rumphius' *Turris* is revived for the *Pleurotoma* group (the first species being *Murex babylonius* Gmelin) following Müller and the "Museum Calonnianum." The following year Lamarck published his epoch-making "Prodrome d'une Nouvelle Classification des Coquilles," in which the groups above discussed were given the following names and types:—

<i>Rostellaria</i>	-	<i>Strombus fusus</i> Linné.
<i>Fusus</i>	-	<i>Murex colus</i> Linné.
<i>Pleurotoma</i>	-	<i>Murex babylonius</i> Linné.

In 1801 this was followed by his "Système des Animaux sans Vertèbres," where we find:—

<i>Rostellaria</i>	-	<i>R. subulata</i> Lam.
<i>Fusus</i>	-	<i>F. longicauda</i> Lam.
<i>Pleurotoma</i>	-	<i>P. babylonica</i> Lam.

In 1802 Bosc¹ adopts *Rostellaria* and mentions Lamarck's other genera, but in his text includes them all under *Murex*. Roissy, in 1806,² adopts all the above-mentioned names of Lamarck with the same types. Montfort, in 1810, does the same, except that he modifies *Rostellaria* to *Rostellum* and *Pleurotoma* to *Pleurotomus*.

Link, in 1807,³ adopts the Lamarckian *Pleurotoma* and *Rostellaria*, but combines the *Neptunæa*, *Colus*, and *Fusus* of Bolten under the first name. Perry, in 1811,⁴ unites *Fusus* and *Pleurotoma* under the name of *Murex*, while retaining *Rostellaria*. In 1817, Schumacher⁵ accepts Lamarck's names for the above-mentioned groups.

This brings us to the period of the "Animaux sans Vertèbres," after which the influence of Lamarck prevailed to such an extent as to cause a general acquiescence in his nomenclature, the changes being chiefly of the nature of subdivisions, with which, on this occasion, we are not concerned.

It is evident from the foregoing:—First, that the first binomial use of the generic name *Fusus* was by Helbling in the year 1779. Second,

1 "Hist. Nat. des Coq.," t. 4.

2 "Hist. Nat. des Mollusques," t. 6.

3 "Beschr. Rostock Sammlung," Lief 3.

4 "Conchology or Natural History of Shells."

5 "Essai d'un Nouveau Système des Habitations des Vers."

that to the group which he thus named he referred four shells, which according to our present usage belong—two to *Pleurotoma* s.s., one to *Drillia*, and the fourth to *Cumia*. Third, that by the rules of nomenclature the type of *Fusus* must be taken from among the species referred to it when first proposed, and, consequently, that type must be one of the four species just mentioned, neither of which belongs to the genus *Fusus* as commonly understood.

Of these species, numbers one and three belong to typical *Pleurotoma* Lamarck, 1799; number two to *Drillia* Gray, 1838; and number four to the subdivision of *Colubraria*, which was named *Cumia* by Bivona in 1838. The inclusion of the latter was not so remarkable as might at first sight appear, since there is an angle, almost a sinus, at the posterior portion of the outer lip and the shell is not tortuous as in the typical *Colubraria*.

If we take Helbling's first species as the type, it will be a typical *Pleurotoma*, which would be most unfortunate, as this name has been universally accepted for one of the most prolific groups of mollusks and utilized in a modified way for the family to which they belong. Probably no name could be mentioned the change of which would produce in the literature of malacology so large a number of regrettable alterations in nomenclature, especially if such a well-known name as *Fusus* were substituted for it. It seems, therefore, better to proceed by the method of elimination in order to decide on a type. The genus *Drillia*, to which one of the two remaining species belongs, was proposed by Gray in the January number of Jardine's *Magazine of Natural History* for 1838. It is almost certain that this publication antedates that of Bivona printed in the same year, but of which a copy does not seem to exist in the United States. The type of *Drillia* was *D. umbilicata* Gray, from Sierra Leone. If we assume the earlier publication of *Drillia* we must fall back on the *Cumia reticulata* of Blainville (as *Tritonium*) which has been the accepted specific name of Bivona's type. It is probable that less confusion will be caused by this arrangement than if either of the other species were selected as type; as the number of species of *Cumia* is small, and fewer changes would be involved, especially if the typical *Colubraria* should prove to be distinct generically from *Cumia*.

Of the other groups to which the name *Fusus* has been applied, *Rostellaria* will take the name *Tibia* given by Bolten, *Pleurotoma* will be called *Turris* Bolten.

If, as I believe, all anonymous writings, or works without a definite publisher, should be excluded from consideration in matters relating to nomenclature, the names of the "Museum Calonnianum" will have no standing. *Colus* of that work will, therefore, not prevent the use

of *Colus* Bolten, if the latter is otherwise valid. For this last, *Murex islandicus* might serve as type, thereby preserving *Fasciolaria* Lamarck.

It is an unfortunate fact that the abrogation of the original rule requiring a diagnosis to validate a genus, will result in a nearly complete obliteration of the Lamarckian systematic names among mollusks. Nearly all of Lamarck's own genera of shells were anticipated by Bolten, who seems to have been, in spite of certain infelicities in his system, far in advance of most of the conchologists of his time, and as scientific as one could expect at a period when no one knew much about the anatomy or precursors of the existent mollusk-fauna, and people were compelled to base their classification upon the shell-characters of a relatively small number of species.

The changes that will ensue on the application of the rules of nomenclature to the systematic names of Bolten and Lamarck are so great that I have thought it well to add to this paper the following list, in which in all the simpler cases the results are indicated. I have not included the Linnean genera adopted by Bolten and in which no change will occur, but only the new names introduced by Bolten, their type (*t.*), or first species (*1*), and their next subsequent equivalents from Lamarck or his successors. When the equivalence is exact, the prior name is preceded by an asterisk as an indication that it will take precedence. In the other cases where the Boltenian genus is heterogeneous, an indication of its contents is given, but this is not complete except for the less complicated cases. The very complex cases, which will require special study to unravel, are indicated by a double dagger (‡).

BOLTENIAN NAME, 1798.	POST BOLTENIAN NAME, ETC.
* <i>Sinum</i> (<i>halioideus</i> <i>L.</i>).	<i>Sigaretus</i> <i>Lam.</i> , 1799.
<i>Albula</i> (<i>1. albumen</i> <i>L.</i>).	* <i>Natica</i> <i>Scopoli</i> , 1777.
* <i>Cyphoma</i> (<i>t. gibbosa</i> <i>Lam.</i>).	<i>Ultimus</i> <i>Montfort</i> , 1810.
<i>Volva</i> (<i>1. ovum</i> <i>Gmel.</i>).	* <i>Ovula</i> pars <i>Bruguère</i> , 1789.
<i>Porphyria</i> (<i>1. porphyria</i> <i>Gmel.</i>).	* <i>Oliva</i> <i>Martyn</i> , 1784.
<i>Cucullus</i> (<i>not of Linné</i>).	* <i>Conus</i> <i>Linné</i> , 1758.
‡ <i>Pterygia</i> (<i>1. glabella</i> <i>Gmel.</i>).	<i>Persicula</i> <i>Schum.</i> , 1817.
* <i>Morum</i> (<i>t. oniscus</i> <i>Gmel.</i>).	<i>Oniscia</i> <i>Sowerby</i> , 1825.
* <i>Galeodes</i> (<i>t. melongena</i> <i>Gmel.</i>).	<i>Melongena</i> <i>Schum.</i> , 1817.
* <i>Thais</i> (<i>1. Purpura neritoides</i> <i>Lam.</i>).	<i>Purpura</i> <i>Lam. non Martyn</i> .
* <i>Drupa</i> (<i>1. horrida</i> <i>Lam.</i>).	<i>Ricinella</i> <i>Schum.</i> , 1817.
* <i>Vasum</i> (<i>1. capitellum</i> <i>Gmel.</i>).	<i>Turbinella</i> pars <i>Lam.</i> , 1799.
‡ <i>Volema</i> (<i>1. pyrum</i> <i>Gmel.</i>).	<i>Turbinella</i> pars <i>Lam.</i> , 1799, etc.
<i>Pyramis</i> (<i>immature shells</i>).	* <i>Strombus</i> <i>Linné</i> , 1758.
<i>Plejona</i> (<i>1. hebræa</i> <i>Lin.</i>).	* <i>Voluta</i> (<i>L.</i>), <i>Scopoli</i> , 1777.
<i>Lambis</i> (<i>1. Strombus pugilis</i> <i>L.</i>).	<i>Strombus</i> pars <i>Linné</i> , 1758.

BOLTENIAN NAME, 1798.

Verpa (*t. penis Gmel.*).

† Angaria (1. delphinus *Gmel.*).

† Planorbis (2. corneus *Gmel.*).

† Pomatia (1. aspersa *L.*).

† Janthina (1. janthina *Gmel.*).

† Lampadion (1. carocolla *Gmel.*).

* Architectonica (1. perspectiva *Gm.*).

Astræa (1. imperialis *Gmel.*).

Cidaris (*not of Leske*, 1788).

† Cerion (1. Turbo uva *Gmel.*).

† Epitonium (1. scalaris *Gmel.*).

† Plotia (1. vibex *Gmel.*).

† Strombus (1. palustris *Gmel.*).

Lunatica (1. olearius *Gmel.*).

† Lunella (1. coronatus *Gmel.*).

* Pythia (*t. scarabæus Gmel.*).

† Ellobium (1. auris-judæ *Gmel.*).

† Helix (1. fasciata *Gmel.*).

* Thiara (*t. amarula Gmel.*).

* Pupa (1. flammea *Gmel.*).

* Oleacina (*t. Bulla voluta Gmel.*).

† Ampulla (1. achatina *Gmel.*).

† Neptunea (1. antiquus *Gmel.*).

† Colus (1. tulipa *Gmel.*).

† Fusus (1. trapezium *Gmel.*).

† Syrinx (1. aruanus *Gmel.*).

* Tibia (*t. fusus Linne.*).

* Turris (1. babylonius *Gmel.*).

† Tritonium (1. tritonis *L.*).

† Bursa (1. rana *Gmel.*).

† Cymatium (1. femorale *Gmel.*).

† Cabestana (1. cutaceus *Gmel.*).

† Nucella (1. reticulata *Lam.*).

Lagena (1. undosum *Gmel.*).

Nassa (1. sertum *Lam.*).

POST-BOLTENIAN NAME, ETC.

* Penicillus *Brug.*, 1789.

Dephinula *Lam.*, 1804.

Planorbis *Lam.*, 1799.

Helix pars *Lam.*, 1799.

Janthina *Lam.*, 1799.

Carocolla *Schum.*, 1817.

Solarium *Lam.*, 1799.

Astralium *Link*, 1807 + Xenophora *Fischer*, 1807.

Turbo pars *Lamarck*.

Strophia *Albers*, 1850, etc.

Scalaria *Lam.*, 1801 + Turritella

Lam., 1801 + Terebra *Brug.*, 1789.

Melania *Lam.*, 1799, etc.

Pyrazus *Montfort*, 1810, etc.

Turbo *Linné*, *ex parte*.

Turbo *Linné*, *ex parte*.

Scarabus *Montfort*, 1810.

Auricula *Lam.*, 1799 + Melampus

Montfort, 1810 + Sidula *Gray*, 1840.

Achatina *Lam.*, 1801, etc.

Melania *Lam.*, 1799.

Solidula *Fischer*, 1807.

Glandina *Schum.*, 1817 + Poly-

phemus *Montfort*, 1810.

Achatina *Lam.*, 1799.

Trophon *Montfort*, 1810, etc.

Fasciolaria *Lam.*, 1799, etc.

Fasciolaria *Lam.*, 1799, etc.

Fusus *Lam.*, 1799, etc.

Rostellaria *Lam.*, 1799.

Pleurotoma *Lam.*, 1799.

Septa *Perry* 1811, etc., *not* Triton-

ium of *Müller*, 1776.

Gyrineum *Link*, 1807.

Lotorium *Montfort*, 1810.

Aquillus *Montfort*, 1810.

Cancellaria *Lam.*, 1799, etc.

Not Lagena *Walker*, 1784.

Iopas *Adams*, 1853, etc.

- † *Cantharus* (1. *tranquebarica* *Gmel.*) *Tritonidea Swainson*, etc.
 † *Distorsio* (1. *anus* *Gmel.*) *Distortrix* + *Arcularia Link*, 1807
 + *Gutturium Mörch*, 1852.
 * *Xancus* (*t. Voluta pyrum* *Gmel.*) *Turbinella Lam.*, 1799. *See above*
Volema.
 * *Pyrene* (*t. discors* *Gmel.*) *Columbella Lam.*, pars.
 * *Terebellum* (*t. Bulla terebellum* *Gmel.*) *Terebellum Lam.*, 1801.
Mitra (1. *papalis* *Gmel.*) * *Mitra Martyn*, 1784.
 * *Vexillum* (1. *Mitra plicaria* *Lam.*) *Vulpecula Blainville*, 1824.
 † *Purpura* (1. *Murex vitulinus* *Lam.*) *Murex* + *Ocenebra* + *Vitularia* +
Phyllonotus, etc. (= *Purpura*,
Martyn, 1784).
 * *Murex* (1. *M. haustellum* *Gmel.*) *Brontes Montfort*, 1810.
 * *Tudicla* (1. *Pyrula spirillus* *Lam.*) *Pyrella Swainson*, 1834.
Pila (*t. Helix ampullacea* *Gmel.*) *Ampullaria Lam.* pars, 1799.
Cochlis (1. *Nerita spadicea* *Gmel.*) *Natica Scopoli*, 1777.
 * *Ficus* (*t. Bulla ficus* *Gmel.*) *Pyrula Lam.*, 1799, *Ficula Swain-*
son, 1840.
 * *Rapa* (*t. Pyrula rapa* *Lam.*) *Rapella Swainson*, 1840.
 * *Busycon* (1. *Fulgur carica* *Mtf.*) *Fulgur Montfort*, 1810.
 * *Harpa* (1. *ventricosa* *Lam.*) *Harpa Lam.*, 1799.
Cadus (1. *Dolium perdix* *Lam.*) * *Tonna Brunnich*, 1772.
 † *Cymbium* (1. *Voluta æthiopica* *Gmel.*) *Melo Brod.*, 1826.
Solen (1. *S. siliqua* *L.*) * *Solen Linné*, 1758.
 † *Laternula* (1. *Mya truncata* *Gmel.*) *Mya* (L.) + *Lam.*, *Auriscalpium*
Megerle, 1811 + *Anatina Lam.*,
 1812.
 * *Vulsella* (*t. Mya vulsella* *Gmel.*) *Vulsella Lam.*, 1799.
Lithophaga (*t. Myt. lithophagus* *L.*) *Lithophagus Meg.*, 1811.
Mya (1. *M. pictorum*) *Unio Retzius*, 1788 + *Margaritana*
Schum., 1817.
 † *Musculus* *L.* (1. *Anodonta cygnæa* *L.*) *Anodontites Brug.*, 1792 + *Ano-*
donta Lam., 1799 + *Modiolus*
Lam., 1799 + *Modiolaria Beck*,
 1840.
Mytilus (1. *M. unguatus* *Gmel.*) *Mytilus Linné*, *ex parte*.
Pharetra (*t. Lingula anatina* *Lam.*) * *Lingula Brug.*, 1797.
Beguina (1. *phrenetica* *Linné*) *Cardita pars Lam.*, 1799.
Mantellum (1. *Lima excavata* *Gm.*) *Lima Brug.*, 1797.
 * *Chlamys* (1. *P. islandicus* *Müll.*) *Pecten Müller*, 1776, *ex parte*.
Pecten (1. *P. maximus* *Gmel.*) *Pecten (Müller) Lam.*, s.s.
 * *Amusium* (*t. pleuronectes* *Gmel.*) *Amusium Mühlfeldt*, 1811.

BOLTENIAN NAME, 1798.	POST-BOLTENIAN NAME, ETC.
Ephippium (<i>t. E. sella Gmel.</i>).	Sellaria <i>Link</i> , 1807.
Calopodium (<i>t. rostrata Lam.</i>).	*Pandora <i>Brug.</i> , 1797.
†Pinctada (1. Myt. margaritiferus <i>Gmel.</i>).	Avicula <i>Brug.</i> , 1791 + Malleus <i>Lam.</i> , 1799 + Margaritiphora <i>Megerle</i> , 1811.
Isogonum (1. Ostrea isognomum <i>Gmel.</i>).	*Melina <i>Retz.</i> , 1788.
*Lopha (1. Ostrea cristagalli <i>Gmel.</i>).	Ostrea <i>L.</i> , <i>ex parte</i> .
Ostrea (1. O. virginica <i>Gmel.</i>).	Ostrea (<i>L.</i>) <i>Lam.</i> , 1799.
Mactra (1. M. glauca <i>Gmel.</i>).	Mactra <i>L.</i> , 1758, <i>ex parte</i> .
Tridachnes (1. gigas).	Tridacna <i>Brug.</i> , 1767
Tuceta (1. pilosus <i>Gmel.</i>).	Glycymeris <i>Da Costa</i> , 1778, <i>pars</i> .
†Arca (1. A. cucullus <i>Gmel.</i>).	Cucullæa <i>Lam.</i> , 1801, Arca <i>L.</i> , <i>pars</i> .
*Trisidos (<i>t. A. tortuosa Gmel.</i>).	Trisis <i>Oken</i> , 1815.
†Paphia (<i>t. ala-papilionis Bolt.</i>).	Tapes <i>Megerle</i> , 1811.
Gafrarium (<i>t. pectinata L.</i>).	Paphia <i>Oken</i> , 1815.
Cytherea (<i>t. puerpera L.</i>).	Antigona <i>Roemer</i> , 1857.
Venus (1. chione <i>Gmel.</i>).	Venus <i>L.</i> , 1758, <i>ex parte</i> .
Donax (1. scortum <i>Gmel.</i>).	Donax <i>L.</i> , 1758.
Corbula (1. Macoma polygona <i>Ch.</i>).	Not Corbula <i>Brug.</i> , 1797.
*Corculum (<i>t. C. cardissa Gmel.</i>).	Cardissa <i>Megerle</i> , 1811.
*Fragum (1. hemicardium <i>Gmel.</i>).	Hemicardium <i>Cuvier</i> , 1817.
Cardium (1. C. costatum <i>L.</i>).	Cardium <i>Linné</i> , 1758.
Anomia (1. dorsata <i>Gmel.</i>).	Terebratula <i>Müller</i> , 1776.
Fenestrella (1. Anomia ephippium <i>L.</i>).	Anomia <i>Müller</i> , 1776.

The Shell Beach at Mochras Island.—To the scientifically-minded casual visitor to North Wales I hold with Mr. J. Cosmo Melvill that Mochras Island is a delusion and a snare. If a conchologist is in this neighbourhood and is not desirous of filling a clothes basket with old valves of *Pecten maximus* and *Lutraria*, etc., but is after something rare and strange, may I suggest that the train be taken to Harlech, instead of Llanbeder, the station for "The Shell Island." Here a short walk across the fields soon brings you to the beach, and continuing in the direction of Mochras Island a profusion of shells may be found, in almost perfect preservation. I was surprised at the number of *Solen ensis*, *S. vagina*, *S. siliqua*, and the rarer *Cultellus pellucidus*, in endless numbers, while among the smaller shells were *Aclis minor*, *Chemnitzia elegantissima*, *Onoba striata*, *Zippora membranacea* var. *venusta*, *Tornatina truncatula*, *Clathrulla linearis* and *Modiolaria marmorata* all beautifully perfect. These were just a few picked up at random as time was short, no doubt other varieties are to be found.—J. DAVY DEAN (*Read before the Society*, September 13th, 1905).

NUDIBRANCHS AND TECTIBRANCHS FROM THE INDO-PACIFIC.

II., Notes on *Lophocercus*, *Lobiger*, *Haminæa*, and *Newnesia*.

By SIR CHARLES ELIOT, K.C.M.G.

(Read before the Society, December 13th, 1905).

PLATE V.

LOPHOCERCIDÆ H. AND A. ADAMS.

FOR the previous literature of this family, anatomical and systematic, reference may be made to Bergh,¹ Pilsbry,² and the authorities cited by these writers. More recently Mazzarelli³ has given some further biological notes on *Lobiger*.

The *Lophocercidæ* are of moderate size, with thin bulloid shells, which do not nearly contain the body, and with variously developed lateral lobes. They can swim as well as crawl. The gill consists of a row of lamellæ attached to the under-surface of the mantle. There are no jaws or stomach plates, but a large buccal crop is present, as well as a diverticulum of the œsophagus. The radula is ascoglossan. The sexual orifices are widely separate; the male orifice lies under the right rhinophore, and is connected with the rest of the reproductive apparatus by an internal duct, not by an external groove.

The members of the family, though nowhere common, appear to be generally distributed in the warmer waters of the Mediterranean, Atlantic, and Indo-Pacific, but have not hitherto been found on the west coast of America. The species show surprisingly little variety, so that some authors have thought there is only one for each genus. I myself am inclined to think that the Atlantic and Indo-Pacific forms can be distinguished, though they are nearly allied. Several species have been imperfectly described, but the following seem fairly certain.

***Lophocercus*.**

- | | |
|---|--|
| { | <ol style="list-style-type: none"> 1. <i>Lophocercus sieboldi</i> (=olivacea) <i>Krohn</i>. Med. and Atlantic. 2. <i>L. antillarum</i> (<i>Mörch</i>). Atlantic. 3. <i>L. viridis</i> <i>Pease</i>. Indo-Pacific. |
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***Lobiger*.**

1. *Lob. philippii* (= *serradifalci*)⁴ *Krohn*. Med. and probably Atlantic.
2. *Lob. nevillei* *Pilsbry*. Indo-Pacific.

¹ "Malacologische Untersuchungen," *Semper's Reisen*, VII., part 2, section ii., 1. p. 186, ff.

² "Man. Conch.," vol. 16, p. 161, ff.

³ *Atti. Soc. Ital. Mus. Milano*, vol. 42, part 3, p. 281, Nov., 1903.

⁴ Authors give the specific name variously, according as they consider that *Lob. philippii* *Krohn* can or can not be identified with the earlier *Bullea serradifalci* of *Calcare*.

Bergh and von Jhering unite the Lophocercidæ with the Limapontiadæ, Elysiadæ, Phyllobranchidæ, and Hermæidæ, in the group Ascoglossa, which thus comprises animals of very different appearance, and is regarded as forming a connecting link between the Tectibranchiata and Nudibranchiata. As to the affinities of the Lophocercidæ with the Bullacea, there can be little doubt. The external characters are very similar, and the main differences are anatomical; the digestive apparatus, the peculiar gill, and the absence of an external seminal groove. But the recently-described genus *Newnesia* (E. A. Smith, 1902) bridges over the gap to a great extent, inasmuch as it has a gill which appears to be intermediate between the structures found in *Bulla* and the Lophocercidæ, a uniseriate though not ascoglossan radula, no jaws, and no stomach plates. Some notes on this genus are appended to the present paper. Also, it would appear from Bergh's investigations (*Semper's Reisen*, VII., iv., iii., p. 249) that in *Aplustrum* there is an internal seminal duct and no external groove. Most of the characters of the Lophocercidæ (except the buccal crop and ascoglossan radula) are thus found in some members of the Bullacea.

Their affinities to the Elysiadæ and other families above mentioned are at any rate less obvious, and are denied by Pelseneer.¹ The most recent writer on the subject, however, Bruel² is inclined to emphasize these affinities.³ The most remarkable point of resemblance is the striking similarity of the digestive organs, but this may be explicable by similarity of diet. Nothing seems to be known of the food of the Lophocercidæ, but some Ascoglossa live on the juices of seaweeds, which are drawn up into the buccal crop and forced through the alimentary tubes by the muscular contraction of this organ. No jaws are required for this process, and the radula is only used for scratching the surface of the seaweed, which explains why the teeth are not worn away. Now, it would appear that the nudibranchiate type is the result of the larva breaking its shell and developing more or less symmetrically, whereas the tectibranchiate type, in cases where the shell is reduced or suppressed, is the result of the body growing over the shell without altering the asymmetrical position of the gill and other organs. If *Lophocercus* lost its shell and gill, so that the pericardium and renal organ were spread on the top of the visceral mass, it would become an animal not unlike *Placobranchus*. But

¹ "Recherches sur divers Opisthobranches," 1893.

² "Geschlechts- und Verdauungsorgane von *Caliphylla mediterranea* Halle," 1904.

³ "*Caliphylla* steht, selbst unzweifelbar den Ascoglossen zugehörig, gleichwohl der Gattung *Lobiger* in eine Reihe von Charakteren die diese von jenen trennen (Lage der Niere, der Aorta im Schlundring, doppelte Tentakel-nerven, Bau des Kropfes und der Oesophagusdrüse) so ausserordentlich nahe dass ein natürliches System auch den *Lobiger* aus der Ascoglossengruppe nicht ausscheiden darf." *l.c.*, p. 112.

assuming that *Lophocercus* and *Placobranchus* are developed from similar larvæ, one of which develops as a Tectibranch, preserving its shell, and the other as a Nudibranch, breaking its shell, does it follow that for systematic purposes the two forms should be separated from the Tectibranchs and Nudibranchs respectively and united in one group?

Lophocercus.

This genus has usually been called *Lophocercus* by those who have treated of it separately (Krohn, Souleyet, Bergh, etc.), but *Oxynoe* by the authors of general works on conchology and malacology (Pilsbry, Fischer). It would seem that the former name is entitled to priority, and that the title *Oxynoe* Rafinesque, 1819, is really misleading, inasmuch as the name cannot be shown to have been applied to this animal before 1863.

Rafinesque¹ describes it thus:—"Oxynoe (mollusque) corps rampant à grande coquille dorsale extérieure, bulliforme, à spire simple, ventre ou pied étroit à branchies marginales striées transversalement, manteau élargi en deux ailes latérales, deux tentacules non retractiles. Différent du genre *Sigaretus* par sa coquille extérieure, etc." This description is not only inadequate, but it is impossible to say with certainty that it is an attempt to describe *Lophocercus*, since no notice is taken of the most characteristic external feature—the long tail. The older malacologists merely reproduce Rafinesque's name without giving any further description, but in 1863 Mörch described under the name of *Oxynoe antillarum* an animal undoubtedly belonging to the genus under consideration; and as this was the first definition of what is really meant by *Oxynoe*, the use of the name must be considered to date from that year, and not from 1819. But in 1847 Krohn gave a full description of the Mediterranean species, under the name of *Lophocercus sieboldi*, which, therefore, seems entitled to priority.

Forbes² says:—"The animal for which I propose to constitute the genus *Icarus*, differs from *Aplysia* in having but two tentacula and in being prolonged posteriorly into a slender lanceolate tail. The dorsal shield resembles the shell of a *Bullæa*." This description is recognizable, though not full, and if the law of priority is strictly applied, the genus should be called *Icarus*; but nothing would be gained by reviving a name which appears not to have been used by any other writer.

Lophocercus is evidently closely allied to *Lobiger*, but is distinguished by its narrow foot, long tail, more distinctly bulloid shell,

¹ *Journal de Physique*, vol. 89, 1819, p. 152.

² "Report on Moll. and Rad. of Aegean," 1844, p. 137.

and the absence of swimming lobes. It swims by strokes of its powerful tail, and the comparatively small wings seem not to be used for purposes of locomotion, but form a chamber which protects the fragile shell and the viscera below it. In internal anatomy the two genera are similar, but *Lophocercus* has a large buccal mass and a moderately large circular crop, whereas in *Lobiger* the buccal mass is small and the elongate coiled crop enormous. Much the same difference is exhibited in the digestive organs of *Cyerce* and *Phyllobranchus*, which are otherwise closely related. *Lobiger* and *Lophocercus* have also each a characteristic form of salivary gland.

Lophocercus is recorded from several parts of the Mediterranean, including the Aegean, the West Indies, Cape Verde Islands, Zanzibar, Ceylon and Southern India, the Sandwich Islands, Tahiti, and the New Hebrides. Six species have been described: *L. sieboldi* (or *olivacea*), *antillarum*, *viridis*, *krohni*, *delicatulus*, and *hargravesi*. Of these, *L. krohni* and *L. hargravesi* are founded on shell characters of doubtful validity; and *L. delicatulus* (G. & H. Nevill, 1869) seems the same as *L. viridis* (Pease, 1861). The remaining species are closely allied to one another, but Bergh (*l.c.*) somewhat doubtfully recognizes *L. sieboldi* and *L. antillarum* as separate, the difference being chiefly in the colour. The Indo-Pacific form seems entitled to specific rank, though by no means sharply distinguished. The most decided difference is in colour, as the body bears blue spots and ocelli, which are absent in the Atlantic and Mediterranean forms. Other points of difference in the shell, genitalia, and other organs are noted below, but in most cases it is hard to be sure that they are really permanent and characteristic of the species, not merely variations depending on age or accident. Perhaps in the Pacific specimens the shell is narrower, the body more plentifully covered with papillæ, and the wings more distinctly raised and united into a chamber enclosing the shell.

Lophocercus viridis Pease. (PLATE V., fig. 5).

Pease, *Proc. Zool. Soc.*, 1861, p. 246; *Amer. Journ. Conch.*, vol. 4, p. 74, pl. 8, fig. 1, 2, pl. 12, fig. 25.

Six specimens from Zanzibar, dredged in one to two fathoms at low water. The notes on the living animals are as follows:—"Colour bright yellowish green, covered with rings of dull yellow. The inside of each ring is bright blue, and each blue area has a clear black spot in the centre. There is a line of pinkish white projecting points down each side, above which, on the edges of the wings, is a similar line of pinkish zigzag points. These two lines meet behind and are continued as a median dorsal line down the tail. The rhinophores are the same colour as the body on their outer sides, the blue spots

extending over them. The foot is extremely long and narrow, with a translucent white border, which is wider in front; this border contains a line of blue spots. The animal swims with rapid lateral movements of the tail, and when first caught was thought to be a small fish." Most of the specimens were small and immature, but one much larger than the rest was about 20 mm. long.

As preserved, it is 17 mm. long; this includes the tail, which projects as it did in life, but not the head, which is retracted into the shell. The shell is 9.5 mm. long, and 6 mm. broad; the wings, which only partially cover it at the sides, are 7 mm. long and 2 mm. high. The shell is much as in *Akera bullata*, with a flat level spire of two or three whorls; it is semitransparent and dull white, with inconspicuous opaque white striæ. The general texture is very thin and fragile. Only the spire is hard and solid, and the inner lip is somewhat callous. The aperture is as long as the shell, dilated below but narrow above and extending into a deep sinus along the suture.

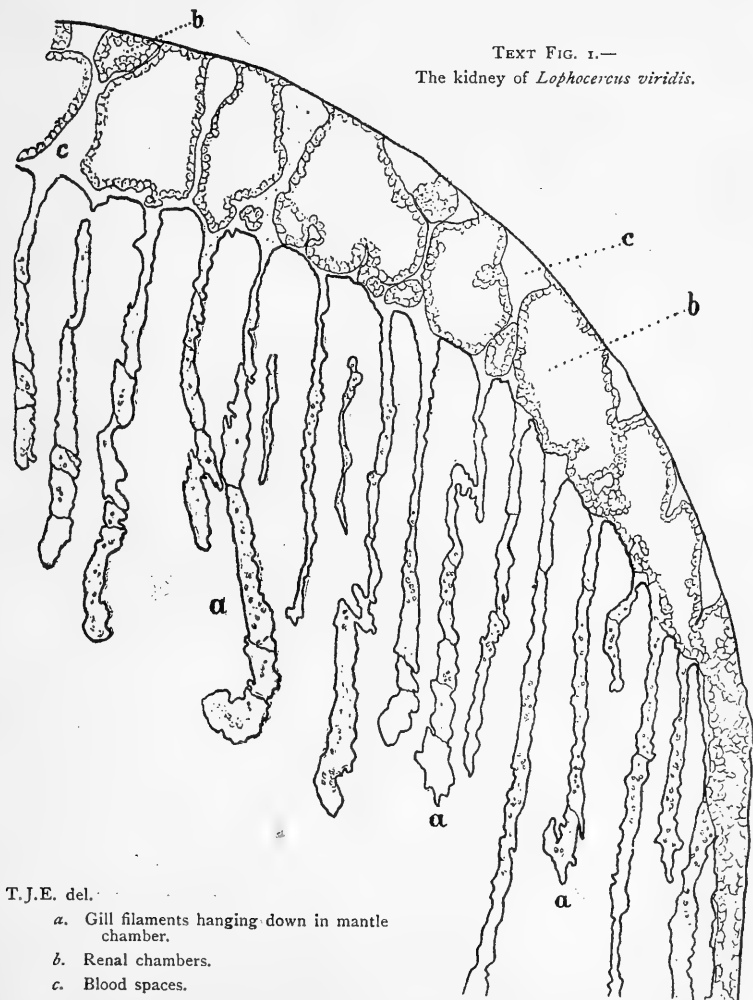
Through the kindness of Mr. E. A. Smith, I have also been allowed to examine two specimens from the British Museum, sent by Mr. E. Thurston from the Madras coast. They are labelled *Oxynoe delicatula* Nevill, but I do not think this species can be separated from *Lophocercus viridis* Pease, which appears to have priority. They are about 30 mm. long (the tail being about 20 mm.), 10 mm. broad at the widest part and 12 mm. high. The colour appears to have been much the same as in the Zanzibar specimens. One specimen is greenish with minute yellow mottlings, the other yellow with greenish mottlings. Both have some deep blue spots, which appear to represent the remains of ocelli, and both have a row of deep blue dots on either side of the foot. The external characters and anatomy of all the specimens seem identical; where measurements are given they refer to the largest.

The body is covered with prominences or papillæ, as much as 1 mm. high, which vary in quantity in the different specimens, but are most numerous on the edges of the wings and upper part of the tail. The anterior margin of the foot is thickened, but no furrow is visible. The sole is a deep groove, seemingly adapted for clinging to stalks. The mouth is large and distinct, with no trace of oral tentacles. The rhinophores are about 3 mm. long, grooved and folded, but in all the specimens stiff and tightly rolled up, not free and foliaceous, as in *Lobiger*. The wings are fairly ample (about 8 mm. long and 6.5 mm. high) but do not cover the shell, immediately behind which they are united and continued in a low thin caudal crest. In some specimens there is a flat area behind the point of junction, and the crest does not begin till further back.

The mantle closely follows the shape of the shell, and rises into a

short spire. On this spire and on the anterior mantle edge are a few blue spots. Across the roof of the mantle chamber—that is on the underside of the mantle—runs the gill, which is an even band of lamellæ, about 3 mm. wide. Between these lamellæ are shorter ones. The pericardium, in which the heart is clearly visible, lies before the gill; behind the gill is an opaque white triangular organ, about 3 mm. long, which is apparently the post-branchial gland mentioned by Bergh.

TEXT FIG. I.—
The kidney of *Lophocercus viridis*.

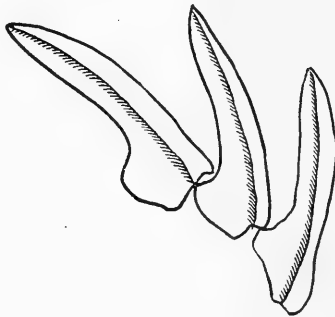


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- a. Gill filaments hanging down in mantle chamber.
- b. Renal chambers.
- c. Blood spaces.

Above the lamella, in the roof of the mantle, is a chamber traversed by tubes which are lined with projecting cells. This is apparently the renal organ. (Text Fig. I).

On removing the mantle cavity the visceral mass is seen rising as a conical projection behind, while the outline of the buccal mass is clearly visible in front. The visceral mass lies quite freely in the cavity formed by the wings, not touching them at the sides and being free for a distance of 5 mm. behind. At that point it is attached to the foot by a large muscle which enters it medianly. It is yellow in colour and seems to be composed of the liver, of the hermaphrodite gland, which is mixed with the liver in parts, and of the mucous gland, which is opaque, solid and not ramified. The liver is a mass of minute ramified tubes and encloses a small round stomach. The course of the intestine is partly visible in the liver, and it terminates in a low anal papilla situated on the visceral mass, a little to the right of the median line. The central nervous system is very difficult to see but is apparently as in Bergh's plates of *L. antillarum*. The eyes are visible externally only in one specimen and are situated just below the rhinophores on the outer side.



TEXT FIG. 2.—Three teeth of *Lophocercus viridis*.

The buccal parts are much as described and figured by Bergh for *L. antillarum*. The anterior portion is in some specimens roundish, in others distinctly divided into sacculations. The posterior portion is yellowish, semitransparent, with a faint longitudinal groove and twelve bright white transverse lines. The buccal crop is proportionally somewhat smaller than in Bergh's figures. Both it and the anterior part of the buccal chamber are distinctly divided into two halves on the lower side. The radula is of the usual ascoglossan type, but the teeth remain more or less in line and do not fall into a confused heap. In a large specimen there are 10 teeth in the ascending series and 30 in the descending; in a small specimen there are 8 teeth in the ascending series, 13 in the descending, and 14 in the heap, but still more or less in position. (Text Fig. 2). They resemble those of *L. antillarum*, but are perhaps somewhat straighter, and the serrulations even finer. The œsophagus is very thin. From its upper

surface arises a diverticulum, 4.5 mm. long, and studded with knobs. The salivary glands consist of a bunch of filaments at the end of a short, stout but tapering duct.

Just inside the mantle cavity is a large pear-shaped papilla on which the female orifice is situated. The penis, which lies behind and below the right rhinophore, is exerted in the largest specimen and is white, 1.5 mm. long and very thin, but thicker at the base.

I think this species may on the whole be referred to *L. viridis* Pease, though differences in the details of coloration are not wanting. I have compared the Pacific specimens with others brought by Mr. Crossland from Boa Vista, Cape Verde Islands, which seem referable to *L. sieboldi* (olivacea).

Lophocercus sieboldi Krohn.

Two specimens from Boa Vista, Cape Verde Islands, are probably referable to this species. The tails have been broken off (possibly by autotomy) but are preserved. The body is about 12 mm. long and 9 mm. broad. The tail about 19 mm. long.

In most points, such as the branchia, buccal mass, salivary glands, diverticulum on the œsophagus, etc., these specimens closely resemble those from the Indo-Pacific. The radula is not appreciably different. It contains 11 teeth in the ascending series, 25 in the descending, and 12 in the heap. Perhaps the following points constitute real differences.

There is no trace of blue spots or ocelli. The colour appears to have been olive with yellowish markings. In one specimen a rich, bright olive green predominates, in the other yellowish brown with a little yellowish green here and there. The shell is milky white, semitransparent, and covered with a perfectly colourless transparent periostracum. It is smooth, not striated, but bears a few marks like scratches. It is somewhat broader in proportion than the shell of the Pacific form, the measurements being about 11 mm. long by 9 mm. broad, as against 10 mm. by 6 mm. for *L. viridis*. In both specimens there are traces of a furrow on the anterior margin of the foot. The visceral mass is flatter than in *L. viridis*, and adheres to the foot over a wider area. The wings do not seem to form so distinct a chamber and are flattened out at the sides as if they were used as a creeping surface. But possibly this configuration is chiefly due to a difference of attitude. There are only a few minute yellow papillæ on the wings and caudal crest. On the roof of the mantle cavity is a triangular area which may represent the postbranchial gland, but it is colourless and not chalky white as in the Pacific specimens. But this white colour may be merely due to a secretion and not indicate a difference of structure. There is perhaps a real difference in the

form of the penis. As in the Pacific specimens it is enclosed in a bag, situated under the right rhinophore, and connected with the female branch by a thin duct which is partly embedded in the body wall. The bag contains not only a soft conical organ as in the Pacific specimens, but also attached to it a thick strong convoluted tube 10 mm. long.

It would appear that this species should be called *L. sieboldi*, not *olivacea*, since if Rafinesque's description is set aside, Krohn's specific as well as his generic name must hold good.

Lobiger.

This genus is easily recognized externally by its remarkable wing-like swimming lobes, which give it somewhat the appearance of a dragon-fly. The shell is flatter than in *Lophocercus*, and the foot broader. The internal anatomy of the two genera is much the same, except that in *Lobiger* the buccal crop is very large and elongate, the salivary glands racemose, and the teeth bear three minute denticles at the tip.

Five species have been described: *L. serradifalci* or *philippii*, *L. souverbii*, *L. viridis*, *L. nevillei*, and *L. wilsoni*.¹ Some details respecting the synonymy, etc., are given by E. A. Smith,² who states that the types in the British Museum show that *L. pellucidus* is not a separate species. *L. souverbii* Fischer from the West Indies is said to be characterised by having only two swimming lobes, one anterior and one posterior; and Pilsbry has proposed a new subgenus for it, *Dipterophysis*. But as *Lobiger* is known sometimes to cast off its lobes, it is eminently probable that this species was founded on a mutilated specimen. *L. wilsoni* Tate from South Australia is possibly a valid species, though imperfectly described. It is of a pale green colour, with oblong rounded lobes, and a very narrow, pointed, smooth tail. *L. pictus* Pease (or *L. viridis* Pease, for he seems to have called it by both names) is described and figured as having four tentacles and has been made the type of a subgenus *Pterygophysis* by Fischer.³ Some authors have regarded this form with scepticism, and it must be admitted that Pease was often inaccurate, but it is noticeable that Pelseneer⁴ describes and figures *L. philippii* as having two pairs of tentacles, and the prolongation of the lips into buccal tentacles does not imply any great morphological change. Pease's account may, therefore, prove correct. G. and H. Nevill described very imperfectly a form from Ceylon under the name of *L. viridis*, which was altered

¹ *L. corneus* Mörch seems to be a name without a description.

² "Notes on the genus *Lobiger*," *Ann. Mag. Nat. Hist.* (6), vol. 3, p. 308-311, Apr., 1889.

³ "Man. de Conchyl.," p. 571.

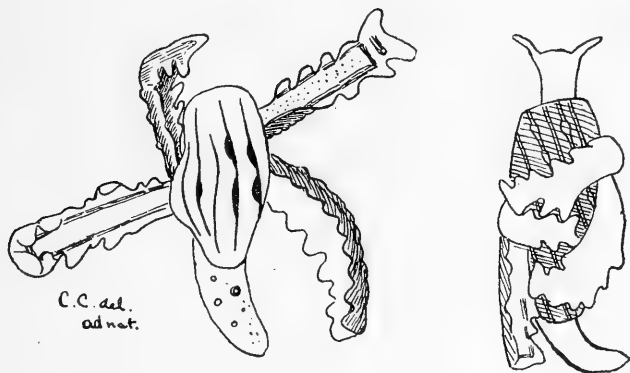
⁴ "Rech. sur divers Opisthobranches," p. 19, 1893.

by Pilsbry ("Manual," p. 168) to *L. nevilli* on the ground that *viridis* is preoccupied by Pease's species. The specimens from the British Museum described below are said to belong to this species, and as the specimen from Zanzibar is identical with them, it would appear that the hitherto commonest Indo-Pacific form should be called *nevilli*. I think it quite possible that this species is the same as *L. viridis*, but, as explained above, do not feel justified in rejecting Pease's statement that that animal had four tentacles. Smith (*l.c.*) seems doubtful whether this *L. nevilli* (= *L. viridis* Nevill) is a separate species, but the specimens which he examined had lost the wings. It appears to be distinguished from the Mediterranean form by a different general coloration, blue lines and blotches on the mantle, which can be seen through the shell, and long narrow wings with indented margins, whereas the wings of the Mediterranean form are oblong, rounded, and with entire margins. Perhaps, also, there is a difference in the structure of the penis.

Lobiger is recorded from much the same area as *Lophocercus*: the Mediterranean, West Indies, Zanzibar, Ceylon, South Australia, and Tahiti.

Lobiger nevilli Pilsbry.

Pilsbry, "Manual," vol. 16, p. 168; E. A. Smith, *l.c.*, p. 311.



TEXT FIG. 3.—*Lobiger* crawling.

One specimen from Chuaka, Zanzibar, dredged in two or three fathoms. The notes on the living animal are as follows:—"General colour bright green. Four large wing-like appendages. Shell large, not enclosed in mantle, and marked by thin dark green lines, expanding here and there into blue blotches. Foot long and narrow. Parts inside the wings light green; the wings have an indented margin, and a not very definite white border. Inside this is a light yellow band, and at the base of each indentation is an orange blotch. There are

brown spots on the upper surface of the foot and wings, as well as more numerous but smaller white ones. The animal was not observed to swim, but crawled, with the wings folded over the shell." It is probable, however, that it can swim like the Mediterranean species.

In the preserved specimen the head is retracted into the shell, which is 6.5 mm. long and 4 mm. broad. The tail projects 4 mm. behind the shell. The front wings are 6 mm. long and 2.5 mm. broad; the hinder are somewhat larger, being 8 mm. long and 3 mm. broad. Each of them has four or five lobes and indentations on either side. The shell as it lies on the animal superficially resembles half a bivalve; it is thin and fragile, but somewhat thicker on the left side, where there is a small concealed spire; ovate, striate, white, semitransparent, with a transparent epidermis. The aperture is as long as the shell, broad below, but narrower above. The mantle is thin and yellow, with five dark longitudinal stripes, which are visible through the shell and give it the appearance of being itself striped.

Through the kindness of Mr. E. A. Smith I have also been able to examine two specimens from the British Museum, labelled "*Lobiger viridis* G. and H. Nevill, Tuticorin, S. India, from E. Thurston, Esq." The shells of both have been removed and the wings and tail broken off. One has also been eviscerated. The carcasses are about 20 mm. long, 10 mm. broad, and 14 mm. high. The colour is dirty olive with dark brown lines and spots on the mantle. There are traces of tubercles at the points where the wings are broken off. All three specimens appear to belong to the same species. The measurements given below apply to the largest.

The foot is not a groove as in *Lophocercus*, but a flat sole about 6 mm. broad, with a fairly ample margin. The rhinophores are grooved and folded, ample, flexible, and somewhat foliaceous. They do not form a continuous veil over the mouth, but are continued in a fold at the side of the head. Under this fold is a brown groove which can have nothing to do with the reproductive system, as it is found on both sides of the head.¹ At the sides of the mouth are rudimentary oral tentacles.

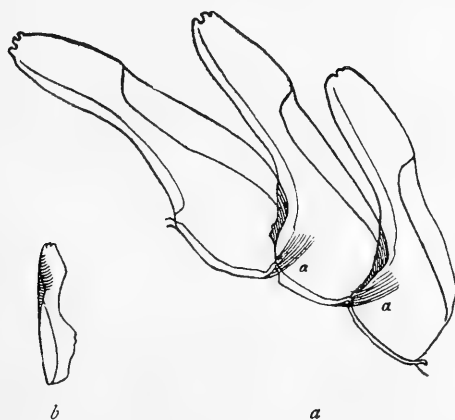
The mantle cavity is much as in *Lophocercus*, but opens more decidedly on the right and not in front. The branchia is clear yellow in colour and large, being 15 mm. long and 4 mm. broad. The auricle lies at the side of the branchia, about the middle, not at the end. The kidney appears to consist of tubes in a chamber above the branchiæ, and to be much as in *Lophocercus*, but is less well preserved than in that genus. I could not find a postbranchial gland like that of *Lophocercus*.

¹ This is perhaps the "Flimmerinne" figured by v. Jhering for *L. philippi* in his paper, "Zur Kenntniss der Saccoglossen," *N. Acta Leop. - Carol. Acad.*, vol. 58 (1892) 1893,

The visceral mass lies horizontally and is not at all raised. It adheres to the floor of the branchial chamber throughout its whole length. It consists chiefly of the liver, which is composed of closely packed tubes. The stomach is enclosed in the liver, which is traversed by several ducts opening into it. The hermaphrodite gland is spread over the surface of the liver and is whiteish, but in places reddish. In the lower portion of the visceral mass lies the large opaque white mucous gland.

The central nervous system appears to be as in *L. philippii*, but the ganglia are distinctly granulated.¹

The buccal mass is small, about 3 mm. long and 1.2 mm. broad, and consists of a round antechamber with dilatations at the side followed by a narrower portion which bears about 12 transverse striations on the upper surface. The crop is enormous compared to the size of the other organs. It consists of a flattish tube about 2 mm. wide, bent on itself four or five times and deep yellow in colour. As it lies, the length is about 5 mm., but if straightened out it would be 20 or 25 mm. long. It shows signs externally of being divided by a whiteish furrow representing the lumen which is about .5 mm. wide, and not always strictly median. The radula contains 6 teeth in the ascending series, of which the first is rudimentary, and 9 in the descending series. (Text Fig. 4). In the heap are more than



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TEXT FIG. 4.—*a*. Three teeth from the radula of *Lobiger nevillei*.
b. A smaller tooth from the heap.

20 teeth of various sizes piled together quite irregularly. The teeth are yellowish at the base and colourless in the upper part. The shape is much as in *L. philippii*, but perhaps a little stouter and more even. In the figure they are shown as seen somewhat from below, which

¹ See Vayssi re's figure, "Opisth. de Marseille," Suppl., pl. iii., fig. 40.

makes the lateral expansions conspicuous. The teeth are attached to the lingual ribbon by ligaments at their bases. On the tip of each are two notches, one wider and rounder than the other, which form three small denticulations. Some of the smaller teeth in the heap show a striation like that of *Lophocercus*, but much stronger. It is not, however, visible in the teeth which are in the row. The salivary glands are grape-like clusters of simple or compound ovate bodies. The oesophagus is very thin. On it rises a large diverticulum, much as in *Lophocercus*, 5 mm. high and studded with simple and compound knobs.

The female orifice is just inside the mantle cavity. Behind it can be seen clearly the mucous gland and two spherical spermathecæ, one larger than the other. The penis is in a bag, hanging freely on the inner side of the body wall under the right rhinophore. The slender vas deferens is free as it enters the bag, but further back is attached to the body wall. The penis is flattish, curved and tapering. The duct can be clearly seen traversing it to the very tip, and the whole organ is divided by transverse striations into a series of segments. This conformation seemed quite clear in all the specimens, but is not indicated in Bergh's figures of *Lobiger philippii* (*l.c.*, pl. 13, figs. 36, 37).

BULLACEA.

These forms have mostly been treated conchologically. The most important information as to the anatomy and systematic morphology is given by Bergh.¹ The more typical Bullids seem to fall into the two genera *Bulla* and *Haminæa*, of which the former has no periostracum on the shell, small parapodia and a narrow radula with the formula 1. 2. 1. 2. 1., while *Haminæa* has the shell covered with a periostracum, larger parapodia, and a wider radula, with a formula varying from 50. 1. 50 to 8. 1. 8. The shape of the stomach plates is also somewhat different in the two genera. *Aplustrum* (= *Hydatina*) though sometimes confounded with these genera differs widely in the male genitalia and digestive organs. The species described below seems referable to *Haminæa*.

Haminæa simillima. (Pl. V., fig. 8).

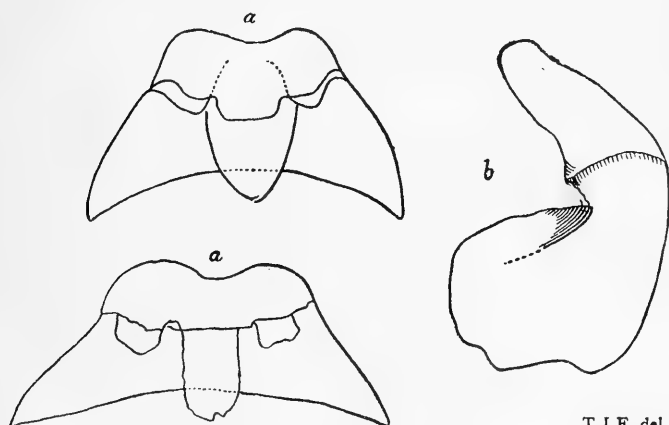
Pease, *Amer. Journ. Conch.*, vol. 4, p. 72, pl. 7, fig. 3, and pl. 12, fig. 21.

Two specimens found on seaweed at half-tide on Prison Island, Zanzibar. When alive they were about 15 mm. long, and 5 mm. across the shell. The head and body were well extended, but the shell was not nearly covered. The ground colour of the body is described as having been light green and white, with numerous distinct

1 "Malacologische Untersuchungen," *Semper's Reisen*, VII., iv., 3, page 209 ff.

bright orange spots. The part covered by the shell was of a darker and somewhat bluish-green, bearing dull orange spots and also bands and blotches of dull red bordered with white. One of the specimens had a few dark violet spots here and there; in the other specimen they were absent.

As preserved the animals are much hardened and contracted, but not withdrawn entirely into the shell, the margins of which are still covered with the various flaps of the body. Most of the flesh is quite hard and deep dark brown in colour; only the liver is soft and greenish. The shell is white, fragile, inconspicuously striated, and covered with a yellowish periostracum. It is shaped much as in Pease's figure (as reproduced in Pilsbry's "Manual") but is slightly narrower in proportion to its length. The rhinophores, gill, etc., appear to have dried up and could not be found.



TEXT FIG. 5.—*a*. Two median teeth of *Haminæa simillima*.
b. A lateral tooth of *Haminæa simillima*.

The labial armature is much as in *H. natalensis*, and consists of slightly bent rods; they are hooked at the tip, and slightly thickened. The radula consists of 35 and 32 rows in the two specimens. In one there are from eight to ten teeth on each side of the rhachidian tooth; in the other the number of laterals was not found to exceed eight. The rhachidian tooth is broad with three cusps, which vary somewhat in shape, and have a sort of hood at the top, but have not rounded outlines and are thin or pointed. The laterals are hamate. The shaft is at first very erect, and then bends rather suddenly backwards. (Text Fig. 5). The first lateral is broader than the rest, and its hook is straight or slightly inclined away from the rhachis, whereas the hooks of the others are inclined towards the rhachis. This difference of direction gives the middle of the radula a confused appearance.

The stomach is armed with three strong brownish-yellow plates, looking much like small Chitons half rolled up. They bear about ten furrows on the dorsal-surface. The second stomach is studded with minute grey prominences.

The living animal corresponded pretty closely with Pease's description of his *Haminea simillima*, though not entirely agreeing with his figure. The species seems allied to *H. natalensis*, recorded from Natal, Mauritius, and Mozambique, which has also a narrow radula, but there seem to be specific differences in the teeth, shell, and stomach plates. The external appearance of *H. natalensis* when alive is unknown.

***Newnesia antarctica* E. A. Smith.**

Smith, "Southern Cross" Collections, Mollusca (Brit. Mus.) 1902, pp. 208-9, pl. xxv., figs. 1-6.

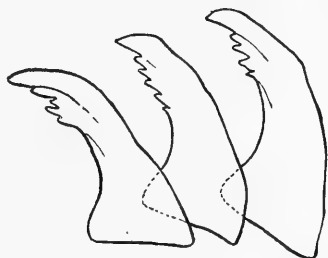
Mr. E. A. Smith has kindly allowed me to examine four specimens of this interesting Mollusc dredged by the "Southern Cross" off Cape Adare. They are not in very good preservation, the tissues having become soft and partially decayed, but the main features of their anatomy seem quite clear. The shells of all have been removed, together with a portion of the visceral mass, but are described in the paper cited above, and said to resemble those of *Hydatina* (*Aplustrum*).

The bodies are of a uniform dirty yellow, and all of much the same size, being about 21 mm. in length, 15 mm. in height, and 13 mm. in breadth. There is a large head-shield, somewhat curved inwards in front, and prolonged behind into two well-developed grooved processes. In one specimen the anterior corners amount to rudimentary tentacles. The orifice of the penis is situated under the right anterior corner. No rhinophorial lamellæ were visible under the sides of the head-shield, though considering the state of preservation their absence is not certain. There are no parapodia or lateral wings, though it seems probable that the animal cannot withdraw entirely into its shell. The foot is large, 15 mm. long and 13 mm. broad. The free portion behind measures 6 mm. and the anterior margin is not grooved. In the sole is a large submedian slit-like opening, leading into a gland 6 mm. long and 3.5 mm. broad. This gland appears to have no connection with the body cavity; it is solid, without a lumen, and of cheese-like consistency. On the left of the visceral mass and behind it is a fold of skin which forms a cup-shaped rim, within which the viscera lie, but there is no such fold on the right hand side.

The mantle cavity is open on the right but not in front. It is rather large, the roof measuring 12 mm. by 9 mm. From the anterior portion

of the roof hangs the gill. It is a strap with a rounded end, 8 to 9 mm. long and 4 to 4.5 mm. broad, bearing on either side transverse lamellæ set in about seven groups, each group containing seven or eight lamellæ. On the floor of the chamber below the gill, and close to the genital papilla, is a second gill-like organ about 3 mm. long and 2.5 mm. wide, composed of about ten lamellæ. It is apparently an osphradium. The renal organ is composed of numerous fine ramifying tubes. The pericardium and heart apparently lie in the left anterior part of the mantle chamber, but could not be identified with certainty in any specimen.

The buccal mass is 7 mm. long and 5 mm. broad. It is not striated. The mouth opens into a spacious chamber with puckered walls. The deep brown radula consists of a single series of from 22 to 25 teeth, of which from 10 to 15 seem to be in use. It is not ascoglossan; the anterior teeth show signs of being worn out, and no doubt disappear in the usual way. Seen in the profile the teeth are very erect. (Text Fig. 6). The back part of each is broad at the base and hollowed out so as to receive the anterior part of the succeeding tooth. Each tooth bears from three to five denticles which are sometimes rather irregular in shape and almost double.



TEXT FIG. 6.—Three teeth of *Newnesia antarctica*.

There are no jaws and no buccal crop. The salivary glands are whitish, thick, and foliaceous, about 4 mm. long and 1.5 mm. broad, with very short ducts.

On leaving the buccal mass, the alimentary tract dilates at once into a large tube which is bent on itself. The first bend (5 mm. long and 2.5 mm. broad) bears a smooth diverticulum on the top about 1.5 mm. high. The second bend is 8 mm. long and 3 mm. broad. The tube bears inside about ten longitudinal lamellæ studded with prominences. Inside the lamellæ can be seen yellowish folliculate bodies which are apparently glandular.

Somewhat embedded in the front of the liver, but not enclosed by it, is the small round stomach. The interior is lined with irregular

soft folds, but shows no trace of plates. From it issues the intestine.

Round the buccal mass is set a collar of ganglia consisting of three pairs on the top and at the sides (cerebral, pleural, and pedal) and one pair (buccal) below. To the right lies a single ganglion, perhaps the ganglion genitale. All the ganglia are quite separate and the commissures fairly long. Under the viscera was found the visceral ganglion, but no eyes could be discovered. Smith says, *Oculi inter bases tentaculorum siti*.

There is a distinct seminal groove running from the female orifice to the right anterior corner of the head. It is bounded by distinct ridges, and in the most extended specimen is 6.5 mm. long, but in most much shorter. The internal bag containing the penis is about 5 mm. long and 2 mm. wide. The organ is not well preserved in any specimen, but appears to be small, faintly grooved and attached to a glandular mass at the bottom of the bag. In any case the structure appears to be simple, and there is no trace of any long convoluted tube.

At the end of the mantle chamber on its right edge is a large prominence about 6 mm. long and 4 mm. broad. It has a free pointed flap at the top, 1.5 mm. long, and a crescent shaped opening. From the lower part of this prominence issues the seminal groove. The crescent-shaped opening, which is doubtless the female orifice, leads into a laminated chamber. Of the internal reproductive organs nothing could be ascertained except that the hermaphrodite gland and the mucous gland are united to the visceral mass in the usual way.

In spite of the unavoidable lacunæ in the above description, it appears pretty certain that this animal belongs to the Bullacea. Its nervous system and reproductive organs seem to be much as in *Bulla*, but in other respects it diverges widely from the typical members of the group, and its nearest ally is perhaps *Diaphana*. Neither *Newnesia* nor *Diaphana* have parapodia, jaws, or stomach plates, and the radula is very narrow, being triseriate in *Diaphana*, uniseriate in *Newnesia*. *Utriculus (Retusa)* may also be allied. It is said to have the posterior corners of the head shield developed into tentacular processes, and no parapodia, but differs in having stomach plates, but no radula. The gill of *Newnesia* is peculiar, being a broad strap, not pointed or plume-like, bearing simple lamellæ on both sides.

If this gill, instead of hanging freely, were attached to the mantle and bore lamellæ on only one side, it would have much the same form as the gill of the Lophocercidæ. The digestive organs also show points of similarity. In both forms there are no jaws and no stomach plates, but there is a uniseriate radula and a diverticulum on

the cesophagus. It is true that the radula of *Newnesia* is not asco-glossan, but the teeth fit into one another and are not unlike those of *Phyllobranchus*. On the other hand *Newnesia* differs from the Lophocercidæ in having no parapodia, no buccal crop, no internal seminal duct but an external seminal groove. In spite of these differences it appears to me to illustrate how the Lophocercidæ may have been developed from the Bullacea.



PROCEEDINGS OF THE CONCHOLOGICAL SOCIETY OF GREAT BRITAIN & IRELAND.

348th Meeting, January 10th, 1906.

Mr. Alfred Leicester (Vice-President) in the chair.

Donations to the Library announced and thanks voted :

The usual periodicals received in exchange.

New Members Elected.

James R. Plant, M.R.C.S., D.P.H., 107, Hinckley Road, Leicester.

Clement L. Wragge, F.R.G.S., F.R.Met.Soc., etc., 26, Jasper Road, Upper Norwood, S.E.

Candidates Proposed for Membership.

W. Ruskin Butterfield, Corporation Museum, Hastings.

F. H. Sikes, 13, Mornington Avenue, West Kensington, W.

Resignations.

Rev. H. Glanville Barnacle. W. O. Dyson. Geo. H. Parke.

It was reported that between the sending to press of the Proceedings of the last meeting and the end of the year Mr. W. Neville Sturt had paid his subscription and tendered his resignation, and it was resolved that the resignation be accepted, and Mr. Neville Sturt's name expunged from the list of those removed from the Roll in terms of Rule 3.

Member Deceased.

R. C. Chaytor.

Papers Read.

"On the danger of using corrosive sublimate to sterilize highly-polished shells," by B. R. Lucas.

"On the Radula of *Vitrina rogersi* compared with that of other Species of the Genus," by W. Moss.

Exhibits.

By Mr. A. Mayfield: Specimens of *Helix aspersa* from Claremont, Capetown, *H. pisana* from Grass at Hout Bay, Capetown, *Paludestrina* from Aldeburgh.

By Mr. F. B. Jennings: A series of examples of *Cypræa obvelata* Lam., from Tahiti, 1904, collected by Mr. C. L. Wragge; also a large white variety of the same, unlocalized, for comparison.

By Mr. B. R. Lucas: Examples of *Cypræa* to illustrate his paper; also *Sphærium rivicola* from Shropshire Union Canal, Chester; *Hygromia hispida* and var. *albida* from Barnton; larva of *Ocyrops olens* feeding upon *Vitrina pellucida* from Whoolton, co. Durham; two varieties of *Cypræa mappa*; and *Vallonia excentrica* from below Barnton.

By Mr. W. Moss: A large series of British *Vitrææ* from many localities; also many foreign species, to illustrate his paper.

By Mr. C. H. Moore: Large *Cardium edule* from Scotland.

A series of the Genus *Chloraea* was shown as a special exhibit by Messrs. J. C. Melvill and Edward Collier; also from the "Darbshire Collection" in the Manchester Museum. All but four of the known species were exhibited, together with examples of the allied Genus *Corasia* for comparison.

349th Meeting, February 14th, 1906.

Mr. Charles Oldham in the chair.

Donations to the Library announced and thanks voted:

"Beiträge zur Kenntnis der Molluskenfauna der Magalhaen-Provinz," by Dr. H. Strebel; "Catalogue of Operculate Land-shells," by Messrs. Sowerby and Fulton (*from the respective authors*); and the usual periodicals received in exchange.

Donation to Cabinet announced and thanks voted:

By Mr. Bartlet Span: *Terebratulula cranium* dredged in the Bay of Biscay.

Donation to the Illustration Fund announced and thanks voted:

From Sir Charles Eliot, K.C.M.G., the sum of £1 6s. od.

New Members Elected.

W. Ruskin Butterfield, Corporation Museum, Hastings.

F. H. Sikes, 13, Mornington Avenue, West Kensington, W.

Member Deceased.

The death of Mr. William Nelson, an original Founder and Honorary Member of the Society, was announced, and the Secretary was instructed to convey to Mrs. Nelson an expression of the Society's sense of Mr. Nelson's services to the science of conchology in general as well as to the Society in particular, and also of its sympathy with his family in their bereavement.

Statement of Accounts.

The statement of income and expenditure for the year 1905 having been signed by the Auditors was presented.

Receipts.	£	s.	d.	Expenditure.	£	s.	d.
Cash in hand, Jan. 1, 1905	15	16	6	Printing <i>Journal</i> for Oct. 1904	11	16	0
Subscriptions	58	11	9	" " Jan. 1905	12	14	6
Advertisements	1	0	0	" " Apr. 1905	11	11	4
Sale of Publications	20	15	11	" " July, 1905	13	8	0
				" " Oct. 1905	11	14	0
				Reprints	4	8	10
				Illustrations—			
				Zincograph Blocks ...	0	5	6
				Plates and Drawings ...	5	2	4
				Library—			
				Bookbinding	0	8	0
				Parts 10 and 11 of Taylor's			
				Monograph	0	10	6
				Stationery	4	11	10
				Recorder's Expenses ...	0	4	11
				Treasurer's "	1	9	0
				Secretary & Editor's Expenses	7	14	0
				Balance forward	10	5	5
	£96	4	2		£96	4	2

Paper Read.

"The Prevention of Corrosion in Shells," by L. St. G. Byne.

Exhibits.

By Mr. J. Wilfrid Jackson : *Physa ancillaria* Say with well defined white bars indicating growth-stages, from Frankfort, Maine, U.S.A.

By the Rev. Canon J. W. Horsley : *Helix pisana*, *H. splendida*, and *Tutiora ferruginea* from Majorca ; *H. hortensis* var. *monozona* from Swanley, North Kent.

A large number of white forms of British Non-Marine Mollusca were shewn as a special exhibit by Messrs. Baldwin, Jackson, Standen, Moore, and Whitehead, and a fine series from the Manchester Museum Collections was also exhibited.

350th Meeting, March 14th, 1906.

Mr. Edward Collier (vice-president) in the chair.

Donations to the Library announced and thanks voted :

"On the Mollusca of East Greenland, I. Lamellibranchiata," by Adolf Sverin Jensen (*from the author*), and the usual periodicals received in exchange.

Donation to the Cabinet announced and thanks voted :

Specimens of *Littorina rudis* var. *jugosa* from the Orkney Islands, from Mr. J. C. Dacie.

Candidates Proposed for Membership.

J. W. Boulton, 50, Waslington Street, Newland, Hull.

V. B. Crowther-Beynon, M.A., F.S.A., The Grange, Edith Weston, Stamford.

Harry Fogerty, 21, Henry Street, Limerick.

Robert Godfrey, M.A., 46, Cumberland Street, Edinburgh.

Alexander Reynell, 152, Selhurst Road, South Norwood, London, S.E.

C. J. Sharp, M.R.C.S., 2, Wellington Avenue, Liverpool.

Commander E. R. Shopland, Weeting, Sheringham, Norfolk.

Edward Step, F.L.S., Oakwood House, Ashstead, Surrey.

Lt.-Col. W. H. Turton, D.S.O., R.E., Harley House, Clifton Down, Bristol.

Papers Read.

"*Jaminia triplicata* Studer, a new British Terrestrial Mollusc," by Dr. G. W. Chaster.

"A Single Haul of Land Mollusca," by F. H. Sikes.

Exhibits.

By Dr. G. W. Chaster : *Jaminia triplicata* Studer from Brandon, Suffolk, and Batzen, Tyrol; and *J. bigranata* Rossm. from Wiesbaden, to illustrate his paper.

By Mr. C. P. Richards (on behalf of Miss A. C. S. Foster) : A remarkable specimen of *Cypræa arabica*, adult, with greatly produced spire; the mouth reduced to two-thirds its normal length by the wedging in of a stone or piece of shell at the anterior end; this the animal has coated with a thick layer of enamel, giving rise to a large livid coloured callosity.

By Mr. J. C. Dacie : A series of very large *Littorina rudis* var. *jugosa* Mont. collected by him last summer in the Orkneys, on a promontory (Plutonic) called "Bigging Brough," facing the Atlantic; the rock weathers into grooves about an inch in depth which are filled with shells of this variety only, all found elsewhere on the shore being of the normal form. The variety appears to possess a wonderful fitness for resisting the powerful spray which more often than not washes violently over the rocky platform.

By Mr. C. H. Moore : Series of *Sphaerium pallidum*, *Valvata piscinalis*, *Paludetrina jenkinsi* and var. *carinata* from a pond at Droylesden, Lancs,

By Mr. J. Laycock: *Loligo media* L. (male) from Colwyn Bay.

By Mr. Chas. Oldham: *Limnaea stagnalis*, a dwarfed form, from pond, West Kirby, Cheshire.

By Mr. J. W. Jackson (on behalf of Mr. A. Leicester): A *Vertigo* from near Southport, of a form quite unknown to all the members present, it being sinistral, but certainly neither *V. pusilla* nor *V. angustior*; it may be an undescribed species. Also photo-micographs of above, and of *V. pusilla* and *V. angustior* for comparison.

By Mr. J. W. Baldwin: *Bythinia tentaculata* var. *albida* from the Bolton Canal.

A very extensive series of the British Vertiginidæ, comprising sets showing variation in size and colour from many localities was exhibited by the President, Dr. G. W. Chaster, Messrs. Oldham, Standen, Moore, Jackson and Collier; the latter also showed, for comparison, 38 species of *Pupa* and *Vertigo* from the Alps, the Pyrennes, Norway, Greece, Abyssinia, and the Cape. Specimens were also shown from the collections of the Society and the Manchester Museum.

It was decided to have the following special exhibits at future meetings:

April 11	...	...	The Genus Vallonia.
May 9	...	...	The British Trochidæ.
June 13	...	...	The Genus Cataulus.

Limax tenellus in Buckinghamshire.—On October 15th last several specimens of *Limax tenellus* were found by Mr. B. T. Lowne and the writer in Burnham Beeches, Buckinghamshire. They were distinctly, rather brightly yellow in colour, with blackish-grey tentacles; and according to Mr. J. W. Taylor, to whom one was submitted, they pertain to the var. *cerea* Held. The other slugs of the place—undoubtedly a remnant of primitive forest—were *Limax arborum*, *L. cinereo-niger*, *Arion subfuscus*, and *A. minimus*.—H. WALLIS KEW (*Read before the Society*, December 13th, 1905).

"Do Swans eat Anodonta cygnea?"—In answer to this question in your last issue, I wish to reply that they certainly do so, and in large quantities. About twenty-six years ago I went to reside at Birchmore House, near Woburn, Bedfordshire, my husband farming its lands. The mansion of our landlord, the Duke of Bedford, Woburn Abbey (so-called from its having been built upon the site of an abbey of the White Cistercians) was about two miles distant; the Park, in which it stood, was only separated by a road from our farm. The first autumn I lived there, I was told by the old groom whom we had taken with the house, that the swans had flown over from the Park to one of our ponds, as they did every year at that time, to eat the mussels out of the pond. I had not then taken up the study of shells, and did not know there were any but marine mussels. Out of curiosity I went to see, and thus first made their acquaintance. At my approach the swans flew away, and over a high wall which formed the boundary of the Park; leaving behind them, on the banks of the pond, numbers of empty shells. Many of them had only one valve broken, and that, the one lying uppermost, so I was able to pick up both right and left whole valves of very large specimens, such as I now know to be *Anodonta cygnea*; beautifully iridescent within. During the twelve years we occupied that farm His Grace the Duke's swans never failed to spend several weeks of the late autumn, coming daily to enjoy the freshwater mussels of what, tradition said, were originally carp-ponds of the Abbey monks.—JESSIE M. BLUNDELL (*Read before the Society*, September 13th, 1905).

JAMINIA TRIPLICATA Studer, A NEW BRITISH TERRESTRIAL MOLLUSC.

By GEORGE W. CHASTER.

(Read before the Society, March 14, 1906).

IN July, 1904, I spent a few days at the quaint, old-world village of Brandon, in Suffolk, whose chief industry, flint working, has been carried on uninterruptedly from prehistoric times. I was principally occupied in collecting Coleoptera and it was by a mere chance that I came across the mollusca which are the subject of this note.

The chalk uplands near the town have been mined for flint from time immemorial and are riddled with disused shafts, which, in the course of time, become filled up, leaving mere hollows in which grow rank grass and nettles. It was after sweeping several of these hollows that I noticed in my net some remarkably small *Jaminia*, resembling *J. muscorum* in miniature. When I afterwards examined the two full-grown specimens obtained, the mouth was seen to be tri-dentate. A day or two later I attempted to procure more examples, but the scorching heat of the sun's rays was so great as to make collecting utterly impossible. On reaching home I became convinced that my find was quite distinct from *J. muscorum*. It seemed to agree in its characters with the continental species, *J. triplicata*, and I sent it to Mr. B. B. Woodward with a request that he would compare it with typical specimens of the latter. He and Mr. E. A. Smith kindly complied and absolutely confirmed my tentative diagnosis.

There still remained one point to clear up. Gwyn Jeffreys in his "British Conchology" mentions a variety of *Pupa marginata* which he considered identical with the *Pupa bigranata* of Rossmässler. It seemed necessary to find out what this *Pupa marginata* var. *bigranata* of Jeffreys really was. Dr. Dall of the U.S. National Museum at Washington kindly searched the Jeffreys' collection and wrote as follows:—"In the Jeffreys' collection there is a fine lot of *P. bigranata* Rossm., and another of *P. triplicata* Studer, marked 'Burgundy.' There is only a single specimen, mounted on a slip of card marked 'var. *bigranata*' (of *Pupa marginata*). The locality of the English '*bigranata*' is given as Richmond. The *triplicata* Studer is a smaller shell by a good deal, smoother, and lighter coloured than the (also Burgundian) *bigranata*. The English specimen is a little weathered, but it agrees with *P. triplicata* and not with *P. bigranata* Rossm., so far as its general form and size are concerned. Some of the *P. triplicata* seem to agree in the armature of the mouth with the English specimen, though we have none labelled var. *bidentata*. Without

claiming to be an authority on these minute animals I am of the opinion that Jeffreys' Richmond specimen belongs to the species of Studer and not that of Rossmässler."

Jaminia triplicata is conspicuously narrower and shorter than any of the forms of *J. muscorum*. The length of continental specimens ranges from 2.5 to 3 mm. My Brandon examples measure just 3 mm. The apex of the shell is proportionately more conical. The mouth is furnished with three teeth in the type form; the tooth on the base of the penultimate whorl having the form, when viewed from below, of a short ridge, instead of being a minute rounded elevation, as in *P. muscorum* and *P. bigranata*.

For the present, therefore, it seems necessary to eliminate *Jaminia muscorum* var. *bigranata* from the British list.

In conclusion I must offer my hearty thanks to Dr. Dall and Messrs. B. B. Woodward, E. A. Smith and J. W. Taylor for the kind assistance they have so courteously given me.

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"Descriptions of Two New Forms of *Polygyra*" [*P. smithi*, *P. inflecta approximans*], by GEO. H. CLAPP. "On Cypræidæ" [several nn.varr.], by S. ROUS. "Shell Collecting on the Mosquito Coast of Nicaragua, V.," by W. H. FLUCK. "New Varieties of North American *Pisidia*," by V. STERKI. "Massachusetts Slugs," by T. D. A. COCKERELL.

"Some notes on living *Strombus pugilis*" [use of operculum in progression and organs of sense], by H. S. COLTON. "A New Chiton [*Tonicella blaneyi*] from New England," by W. H. DALL. "A New Brackish-water Snail [*Paludestrina salsa*] from New England," by H. A. PILSBRY. "*Carychium nannodes* n.sp.," [Huntsville, Ala.], by GEO. H. CLAPP. "Is *Cochlicopa rowelli* a Californian Shell?" by H. A. PILSBRY [further evidence desired]. "*Achatina gracilior* Boettger [= *A. papyracea* var. *adelinae* Pilsbry]; "*Physa rhomboidea*," by T. D. A. COCKERELL [name praeocc., *humerosa* suggested]. "November Snails," by V. STERKI [half-a-dozen spp. recorded].

"New and Little-Known Species of Amnicolidæ," by BRYANT WALKER [*Somatogyrus substriatus*, *S. humerosus*, *S. quadratus*, *S. strengi*, *S. biangulatus*, *S. excavatus*, nn.spp., Florence, Ala.]. "A New Tertiary *Planorbis*" [*P. florissantensis*, Colorado], by T. D. A. COCKERELL. "An Ordovician Gastropod re-

taining Colour Markings" [*Straparollina harpa*, figured], by P. E. RAYMOND. "Shells of Prince Edward Island," by GEO. H. CHADWICK [list of 27 spp.]. "Note on some Forgotten Mollusk-Names," by WM. H. DALL [Benson, *Journ. Asiat. Soc. Bengal*, vol. 24, 1855, Shells of Chusana, and Revision of *Planorbis*]. "Samuel Hart Wright" [obituary notice], by C. W. J. "Note on *Vitrina pfeifferi* Deshayes," by W. H. DALL.

"*Vitrea rhoadsi* and *Succinea retusa magister*," [figured], by H. A. PILSBRY. "Shell-Bearing Mollusca of Frenchman's Bay, Maine" [15 additional spp.], by DWIGHT BLANEY. "Description of New Species of Achatinellidæ [*Partulina flemingi*, *P. lemmoni*, *P. carnicolor*, *P. kaeeana*, nn.spp.] from the Hawaiian Islands," by D. D. BALDWIN. "New and Little-Known Species of Amnicolidæ" [*Somatogyrus tennesseensis*, *S. aldrichi*, *Amnicola pilsbryi*, nn.spp.], by BRYANT WALKER. "New Varieties of North American *Pisidia*," by V. STERKI. "A New Locality for *Planorbis nautilus* Linné" [Algonquin, Ill.], by F. COLLINS BAKER.

The Journal of Malacology, vol. 12, nos. 2-4, June-December, 1905.

"Description of a New *Flammulina* [*F. laingi*] from New Zealand," by HENRY SUTER. "On *Chloritis* (*Austrochloritis*) *pelodes* Pfr. and *pseudo-prunum* Pils.," by H. C. FULTON [synonyms]. "On *Drymaeus euryostomus* Phil. and *D. hamadryas* Phil.," by H. C. FULTON [synonyms]. "Descriptions of New Species of *Papuina*, *Planispira* (*Cristigibba*), *Strophocheilus* (*Borus*), and *Drymaeus*," by H. C. FULTON. "Note on Three Species of Pelecypods," by EDGAR A. SMITH [*Crassatelloides ponderosus*, *Arca pistachia*, *Cardium beehci*].

"Notes on a Collection of Californian Nudibranchs," by T. D. A. COCKERELL and Sir CHARLES ELIOT [*Doridopsis reticulata*, *Acanthodoris rhodoceras*, *Janolus cœruleopictus*, *Spurilla chromosoma*, nn.spp.; *Dirona*, n.gen.; *Phyllobranchopsis enteromorphæ*, n.gen., n.sp.]. "The Genus *Cataulus*, with descriptions of New Forms [*C. smithi*, *C. prestoni*, *C. congener*, nn.spp., Ceylon]," by E. R. SYKES. "Bionomical Considerations in Gastropod Evolution," by J. R. AINSWORTH DAVIS.

"Supplement to the Revision of the New Zealand Polyplacophora, with Descriptions of the New Species," by HENRY SUTER [*Callochiton empleuruss*, *Ischnochiton fulvus*, n.sp., *Plaxiphora murchisoni*, n.sp., and others figured]. "A few Notes from the Antipodes," by H. SUTER [*Paryphanta hochstetteri*, *Scalaria zelebora*, New Zealand Pleurotomidæ]. "On the Habitat and Food of *Helix desertorum*," by the Rev. A. H. COOKE [nourished probably by minute organisms in swallowed sand]. "On the anatomy of *Fusis* (*Solen*) *magnus* Schumacher," "On the anatomy of certain species of Solenidæ," and "Anatomy of various species of Solenidæ, Addenda et Corrigenda," by H. H. BLOOMER. "*Limnæa parva*," by T. D. A. COCKERELL [præocc.].

[Our members will regret to hear that the *Journal of Malacology* ceases with this issue, and will feel grateful to Mr. Collinge for the devotion to science which has led him to continue its publication so long].

Nachrichtsblatt der Deutschen Malacozoologischen Gesellschaft, vol. 38, part 1, Jan.-Mar., 1906.

"Zur Regulierung der Malacologischen Nomenclatur," by H. VON IHERING. "Bemerkung über die Gattung *Photinula*," by J. THIELE. "Eine neue *Levanatina*" [*L. chanzirensis*], by W. KOBELT. "Ein neues Italienisches *Zospeum* [*Z. venetum*]," by C. POLLONERA. "Über eine Reihe von Nacktschnecken, die Herr Dr. Cecconi auf Cypern und in Palaestina gesammelt hat," by H. SIMROTH. "Einiges aus Vorderasien," by P. NÄGELE [*Fruticicola* (*Theba*) *elie*, *Buliminus* (*Amphiscopus*) *ridens*, *Pupa* (*Orcula*) *robusta* nn.spp.]. "Ueber *Lartetia* Bgt. und über D. Geysers Beiträge zur Vitrellenfauna Württemburgs," by O. BOETTGER.

"Einige Seltenheiten aus meiner Sammlung," by C. BÜLOW. "Einfluss des bewegten Wassers auf die Gestaltung der Muscheln aus der Familie Unionidæ Flem.," by H. SELL. "Ueber *Cantareus* s. *Tapada apertus* Born im Terrarium," by H. HONIGMANN. "*Limnea* (*Gulnaria*) *ovata* Drap. var. *Köhleri*, var. nova," by H. HONIGMANN. "Ueber neue Funde von *Cyclostoma elegans* Müller," by HANS MENZEL.

Journal de Conchyliologie, vol. 53, nos. 1-3, May, 1905-Feb., 1906.

"Etude sur les Coquilles de quelques *Cypræa*," by A. VAYSSIÈRE. "Sur quelques espèces nouvelles, mal connues ou faisant double emploi dans le genre *Pecten*," by A. BAVAY. "Note sur la Section *Pyrazus* dans le genre *Potamides* et description d'une espèce nouvelle [*P. rochebrunei*, Turonian of Angoulême]," by L. VIGNAL.

"Liste des Mollusques recoltés par M. le Capitaine de frégate Blaise au Tonkin, et description d'espèces nouvelles," by PH. DAUTZENBERG and H. FISCHER.

"Sur quelques espèces ou variétés nouvelles du genre *Pecten*," by A. BAVAY [*P. (Chlamys) tamsi*, *P. (C.) nympha*, nn.spp. figured]. "Sur quelques coquilles oubliées du Muséum de Paris," by A. BAVAY [7 nn.spp. figured]. "Relevé des Mollusques terrestres et fluviatiles de la péninsule arabique," by C. F. ANCEY [list of 95 spp., *Bulinus dautzenbergi*, nn. for *B. jousseaumei* Smith præocc.]. "Revision des Dreissensidæ vivants du système Européen," by S. BRUSINA [*Congerina* 1 sp., *Dreissensia* 9 spp. recognised]. "Sur l'*Omphalotropis annatonensis* Pfr. et les formes voisines," by C. F. ANCEY [v. *santoensis* n. figured]. "Sur quelques Arches actuelles nommées par Lamarck dans le collection Defrance (Musée de Caen)," by E. LAMY. "Notes critiques et synonymiques (*suite*)," by C. F. ANCEY.

Annales de la Société Royale Zoologique et Malacologique de Belgique, vol. 39.

"La Biologie des Eaux Potables," by AD. KEMNA [few mollusca recorded].

La Feuille des Jeunes Naturalistes (4), vol. 35, 36, nos. 416-425, July, 1905-Mar. 1906.

"Etude sur quelques espèces de la région circa-Méditerranéenne," by COMANDANT CAZIOT. "Géonémie de l'*Helix aspersa*," by E. PACOTTE [request for material]. "Sur la Distribution Géographique de l'*Helix aspersa* Müller," by L. GERMAIN [general account with references].

"Etudes sur quelques espèces de la région circa-méditerranéenne, établies par M. Caziot avec le concours de M. Fagot," by COMANDANT CAZIOT [*Rumina decollata*, *Helix candidissima*]. "Acclimatation de l'*Helix (Bulinus) acuta* Mueller dans le Pas-de-Calais," by A. GIARD. "Présence de l'*Helix acuta* dans le Nord," by Dr. BOULY DE LESDAIN, J. GODON, A. LABEAU.

"Supplément à la Faunule Malacologique des environs de Saint-Malo," by PH. DAUTZENBERG and P. DUROUCHOUX [50 spp.]. "Sur la dispersion vers le nord d'*Helix limbata* Draparnaud," by A. GIARD.

"Les Dépôts jurassiques de la Normandie comparés à ceux du Jura suisse," by ED. GREPPIN. "Supplément à la Faunule Malacologique des environs de Saint-Malo," by PH. DAUTZENBERG and P. DUROUCHOUX [63 spp.]. "Helix introduits dans les départements du Nord et du Pas-de-Calais," by A. GIARD [13 spp.].

"Nouveau genre le Céphalopodes de l'Eocène des environs de Paris," by G. DE ALESSANDRI [*Belosepiella parisiensis*, figured]. "Supplément à la Faunule Malacologique des environs de Saint-Malo (*fin*)," by PH. DAUTZENBERG and P. DUROUCHOUX [70 spp.].

Arkiv for Zoologi, vol. 2, part 4, 1905.

"Mollusca und Brachiopoda gesammelt von der schwedischen zoologischen Polar expedition nach Spitzbergen, dem nordöstlichen Grönland und Jan Mayen i. J. 1900; part 2, Scaphopoda, Gastropoda, Placophora, und zwei vorher nicht erwähnte Lamellibranchiata," by R. HÄGG [*Buccinum bromsi*, n.sp. figured].

Proceedings of the Academy of Natural Sciences of Philadelphia, vol. 57, part 1, 2, Jan.-August, 1905.

"New Japanese Marine Mollusca," by H. A. PILSBRY [*Ethaliella*, n.g. for *E. floccata* Sowerby; 16 nn.spp.]. "Mollusca of the South-Western States, I. *Urocoptidae*; *Helicidae* of Arizona and New Mexico," by H. A. PILSBRY [Annotated catalogue with numerous nn.spp.]. "Mollusca of the Flint and Caroline Islands in the Central Pacific," by H. A. PILSBRY and E. VANATTA [*Liotia voyi*, n.sp.].

"Senility among Gastropods," by BURNETT SMITH. "Notes on some Hawaiian Achatinellidae and Endodontidae," by H. A. PILSBRY and E. G. VANATTA [*Cyclamastra*, *Helicamastra*, nn. sectt, *Amastra discus*, *Endodonta thaanumi*, *E. luctifera*, nn.spp.]. "On Two Hawaiian Cerithiidae" [*C. thannumi*, *C. hawaiiense*], by H. A. PILSBRY and E. G. VANATTA.

The Naturalist, nos. 581-590, June, 1905-Mar., 1906.

"Variety of *Paludestrina jenkinsi* [v. *aculeata*]," by H. OVERTON. "Molluscan Mixes" [Note on preoccupied generic names]. "*Helix hortensis* Müller," by Rev. E. A. WOODRUFFE-PEACOCK [in Broughton Wood, North Lincolnshire]. "Louth Mollusca," by C. S. CARTER [6 spp. recorded]. "*Paludestrina jenkinsi* at New Holland," by W. H. HUTTON. "Notes on some Speeton-Clay Belemnites," by T. SHEPPARD.

The Apteryx, vol. 1, no. 3, July, 1905.

"Unios of New England," by C. ABBOTT DAVIS [list with localities]. "Notes on R.I. Mollusca."

The Irish Naturalist, vol. 14, no. 10—vol. 15, no. 3, Oct., 1905-Mar., 1906.

"Notes on the Invertebrate Fauna of Skerries, Co. Dublin," by NATHANIEL COLGAN [list of Mollusca]. "Notes on the Mollusca of Co. Louth, by P. H. GRIERSON [annotated list with localities]. "*Geomalacus maculosus* on Deenish Island, Co. Kerry," by S. W. KEMP.

"Land and Freshwater Mollusca of N.W. Donegal. 1, Bunbeg, Gweedore, Horn Head, and Glenveagh," by A. W. STELFOX. "2, Rossgnill Peninsula and Sheephaven," by R. WELCH. "New Molluscan Records from Co. Tyrone," by J. N. MILNE and A. W. STELFOX [16 additional spp.]. "A new Station for *Helix virgata*" [Magheramourne], by J. N. MILNE and A. W. STELFOX. "Mollusca from Roscommon," by R. WELCH [10 spp.].

Nature Study, vol. 14, no. 157-160, July-December, 1905.

"The Banded Shell, *Helix nemoralis*," "The Black Slug, *Arion ater*," by W. H. HUTTON [nothing new].

Butlleti de la Institucio Catalana d'Historia Natural, vol. 2, no. 6-9, June-Dec., 1905.

"Etude sur quelques *Helix* de la Catalogne," by COMANDANT CAZIOT [*H. zuluetai* n.sp., *H. conica*, 3 nn.varr.].

"Contributions à la Faune Malacologique de la Catalogne," by P. FAGOT [*Clausilia debilis*, *Pomatias alopioides*, *P. organiicus*, nn.spp. ?]

Transactions of the Aberdeen Working Men's Natural History and Scientific Society, no. 2, 1902-03.

"Marine Conchology of 'Dee,'" by JAMES SIMPSON [list of spp. with notes].

Transactions and Proceedings and Report of the Royal Society of South Australia, vol. 29, Dec., 1905.

"South Australian Nudibranchs, and an Enumeration of the known Australian Species," by H. BASEDOW and C. HEDLEY [6 nn.spp. figured]. "Report on the Mollusca collected by Mr. H. Basedow on the South Australian Government North-West Expedition," by C. HEDLEY [*Thersites basedowi*, *Xanthomelon radiatum*, *X. asperrimum*, nn.spp. figured]. "Notes on South Australian Marine Mollusca, with Description of New Species, part 2," by J. C. VERCO [*Calliostoma zietzi*, *Gena terminalis*, *Astele calliston*, *Clanculus leucomphalus*, nn.spp. figured]. "On Naticoid genera *Lamellaria* and *Caledoniella* from South Australia," by H. BASEDOW [3 nn.spp.].

Journal and Proceedings of the Hamilton Scientific Association, session 1904-5, no. 21.

"Notes on a few Deep-Sea Dredgings, etc."

Records of the Australian Museum, vol. 6, no. 2, 1905.

"Mollusca from One-Hundred-and-Eleven Fathoms, East of Cape Byron, New South Wales," by C. HEDLEY [numerous nn.spp. figd.]. "On a Large Example of *Megalatractus aruanus* L.," by C. HEDLEY [length 1 ft. 10.75 in., weight 10 lb., 12 ozs.].

Transactions of the Academy of Science of St. Louis, vol. 15, no. 3.

"The Molluscan Fauna of McGregor, Iowa," by F. C. BAKER.

"Annotationes Concilii Bibliographici," vol. 1, Zürich, 1905.

[Gives a useful account of the various activities of the useful institution under Dr. Field's direction at Zürich].

"Beiträge zur Kenntnis der Mollusken-fauna der Magalhaen-Provinz," by Dr. HERMANN STREBEL [*Zool. Jahrb. Syst.*, vol. 22, p. 575-666, pl. 21-24, 1905].

[Deals amongst other matters with the Pleurotomidæ, and the genera *Euthria*, *Columbella*, and *Triton*, numerous new species being described and figured].

"On the Mollusca of East Greenland. I., Lamellibranchiata," by A. S. JENSON [*Meddel. om Grönland*, vol. 29, p. 289-362, 1905].

[Contains a discussion of the Fossil Quaternary Mollusca of Greenland].

"Nagra smärre iakttagelser rörande faunan i Bohuslän i mars manad, 1902," by EINAR LÖNNBERG [*Öfvers. k. Vet.-Akad. Förhandl.*, 1902, p. 169-174, 1902].

[Several Nudibranchs recorded with notes].

"Recent Mollusca: A Catalogue of Operculate Land-Shells," by SOWERBY and FULTON (8vo., 11pp., London, 1906).

[A useful list of genera and species, but from its nature necessarily incomplete].

"Variation in Recent Mollusca, Presidential Address," by E. R. SYKES (*Proc. Malac. Soc.*, vol. 6, p. 253-271, 1905).

"The Genus *Anoma* Albers," by E. R. SYKES (*Proc. Malac. Soc.*, vol. 6, p. 253-271, 1904).

"On some Non-Marine Shells from the Austro- and Indo-Malayan Regions," by E. R. SYKES (*J. of Malac.*, vol. 11, p. 87-92, pl. 11, 1904 [11 nn.spp. figured]).

"Fauna Fossile Terziaria di Markuseveg in Croazia," by S. BRUSINA [*Glasnik Naravosl. Društ.*, vii.] [annotated catalogue with several nn.spp., and list of Dreissensiidæ of Dalmatia, Croatia, and Slavonia].

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No. II.

OBSERVATIONS ON THE TERRESTRIAL MOLLUSCA OF
THE DISTRICT AROUND SILVERDALE, LANCASHIRE.

BY R. STANDEN.

(Read before the Society, November 8th, 1905).

IN September and October last I stayed at Silverdale, West Lancashire, close to the shore of Morecambe Bay. Whilst there I made some observations relating to the habits and life-history of certain land-shells, which may be of useful interest to some of my conchologist friends.

The whole area of my researches is situated on the mountain limestone, which, however, does not here attain any great altitude. The district is fairly well wooded almost, in places, down to the water's edge, with here and there dells, or glens, strewn with huge rounded limestone boulders, and full of luxuriant vegetation, reminding one strongly of the little glens, so prolific in mollusca, in County Antrim, north of Ireland. My investigations extended to and included Arnside Knot (522 feet), a picturesque bit of Westmorland, a flank of which (Far Arnside) stretches out promontory-like into the bay. I worked inland as far as Warton Crag (400 feet), Storr's Moss, Leighton Moss, Haweswater Tarn, and also paid a short visit to Grange-over-Sands, which is separated from Arnside by the rivers Kent and Winster. The flora of the whole region is rich and diversified, and altogether it is an ideal spot for any naturalist, whatever his or her particular bent. Its richness in molluscan life has already, to some extent, been shewn in various papers contributed to this *Journal*, but much virgin ground still remains unexplored.

The climbing habits of many of our British land shells are well known, and have been noted by various authors, but the spectacle of *Helix nemoralis* and *H. hortensis* scaling the topmost twigs of the

hawthorn bushes in springtime is always interesting, however familiar it may become to the conchologist as time rolls on. Inland, there is usually plenty of scope for *H. nemoralis* to indulge in this propensity when so inclined, and if opportunity offers, it is not content with bushes, but ascends tree trunks to a height of many yards. The members of the great colonies on the sand dunes of our coasts have, however, perforce to make shift with the marram grass, dwarf sallows, and other seaside plants. In the case of these and some others of our larger *Helices*, there seems little doubt that this climbing propensity has an intimate connection with the pairing instinct. The same is true of *Pomatias elegans*, *Ena montana*, and probably also of *Ena obscura*, and the *Clausilie*—but *Clausilia laminata* and *C. bidentata*, with which I am best acquainted, may be found on trees all through the spring, summer, and autumn. In early spring *C. laminata* ascends trees to a great height, and I have found it thirty feet or more from the ground, on beech and other trees, and that not singly but in numbers, on several occasions when I have, out of curiosity, followed up the slime tracks of our most notably active climbing slug, *Limax arborum*, which makes nought of ascending tall trees to the very top-most branches. But although the pairing instinct may safely be accepted as the explanation of the climbing of our larger *Helices* during the earlier part of the season, I have always observed the actual pairing taking place on or near the ground, and it will not account for similar climbing tendencies on the part of juvenile snails during late autumn, of which some notable instances have from time to time come under my observation.

I devoted much of my time to “sweeping” with a half-circle net of stout canvas, or “beating” into an umbrella for Coleoptera and other insects—an occupation which reveals an infinity of otherwise hidden life—keeping at the same time a keen look-out for anything of interest conchologically. As on prior occasions at this time of the year, I speedily noticed the wonderful abundance of mollusca, mostly juvenile, which came into the net and umbrella—an abundance all the more remarkable when contrasted with the extreme scarcity of shells observed when searching this district during the last week of June and first week of August this year, when the weather was extremely hot and everything dry and parched.

The old wall-fences, crowned in many places with the luxuriant masses of ivy in full bloom, which is everywhere such a prominent feature throughout this district in autumn, are an especially favourite haunt of *Helix aspersa* and *Hygromia rufescens*, and beating the ivy brought down young shells in showers. So abundant was *H. rufescens* that it became in places a perfect nuisance, and many of the captured

insects were spoilt by the slime on the net. Alongside a wood at Windy Scout, near Warton Crag, it was so plentiful on everything, that sometimes I had quite a teacupful of shells in the net at one time, and had to empty it after every few strokes. On one occasion when there had been rain overnight, the wet limestone roads were dotted over with this species, evidently attempting to cross, and one could not walk near the roadside without crunching the shells underfoot. I have an idea that thrushes, hereabouts at anyrate, do not eat *H. rufescens*, or surely they would soon thin its numbers. There are plenty of thrushes about, and "thrush-stones" abound, but I only saw broken shells of *H. aspersa* around them. Of course, this is not proof positive, as a thrush would not require a stone to break *H. rufescens*, but could easily crush such a fragile shell with its beak; still, seeing that the birds go to the trouble of breaking the larger shell, it denotes a marked preference for it over the smaller species crawling about conspicuously in the immediate vicinity of the "thrush-stones. Mice, however, do a considerable amount of destruction amongst this and other small species, and also *H. nemoralis* and *Helicigona arbustorum*, judging from the numbers of gnawed shells to be found under stones in this neighbourhood.

Patches of grass on the sea-cliffs, clumps of tall bracken, or the thick growth of ivy spreading over the ground in the woodlands, when swept yielded enormous quantities of very young *Sphyradium edentulum*, with from three to four whorls. The adult shells of this species have a habit of climbing into the blackberry bushes, and ensconcing themselves at the base of a prickly, but their attachment is so slight that it is difficult to secure them when in this position, owing to their dropping when the bushes are shaken. *Vertigo pygmæa* is fond of climbing up the tall grasses—known locally as "sedges"—growing in damp places, and in a ditch near Warton Crag many specimens occurred at about three feet from the ground, perched in the little cup-like glumes of the grass seeds, and at the junction of the leaves with the stem. On some of the ancient moss-covered wall fences, probably dating back to the time of the Enclosure Act, which came into force in this neighbourhood during the reign of George III, *Vertigo alpestris* and *V. pusilla* abound. Both species are especially common in the vicinity of Haweswater Tarn, and invariably occur just under the topmost stones. *V. substriata* is not so partial to the tops of the walls as the above-named species, but mostly lives at the grassy base, and is common also underneath mossy stones and logs in the woods. This district would appear to be the great metropolis in Lancashire, for these three interesting little species, until of late years considered such rarities, for the older conchologists do not seem to have had the knack of discovering them in any quantity.

On one occasion, whilst "beating" the tall Junipers on Arnside Knot, I was somewhat surprised when a number of fully-grown *Hygromia fusca* came tumbling down into the umbrella; with them came also *Balea perversa*, which as everyone knows, is a capital tree-climber, but I have never before seen it on Juniper, a tree whose armature of spiny leaves would seem to offer but little attraction to any snail, and which the average conchologist may, if provided with nothing but bare hands, quite pardonably pass by. But I have had a little prior experience, since on one occasion in August I "beat" out numbers of very juvenile *H. nemoralis* from the Junipers growing on the "limestone-pavement" on Hampsfell (727 feet), above Grange-over-Sands. Most of my conchological friends, I find, look upon *H. fusca* as a ground-loving species, with a special liking for the Great Hairy Woodrush (*Luzula sylvatica*) and—the testimony of authors notwithstanding—it is not generally credited with more than adventuring upon an occasional excursion over the grass and other herbage, and I have often heard expressions of surprise at failure to find it during summer in some of its well-known haunts. As a matter of fact, this snail is a habitual climber, and ascends trees, chiefly Beeches and Poplars, but more particularly Alders, where it lives during the summer months, clinging to the undersides of the leaves, and feeding upon them, and falls to the ground with them in September and October. It then occupies itself with the business of reproduction, laying its eggs amongst the dead leaves, and thus it is we find it most commonly and remarkably active during the late autumn and winter months or very early spring.

Along the cliffs, from Arnside Knot to Jenny Brown's Point, *Jaminia cylindracea* and *J. muscorum* are extremely abundant, and *Pyramidula rupestris* abounds, both on the cliffs and the inland walls. The limestone cliffs are in many places cracked and lined with small fissures, and these are a favourite haunt into which the two species of *Jaminia* retreat in dry weather, emerging in such numbers after the face of the rocks has been well wetted by a good shower, as to remind one of the clustering swarms of fleas which I have often seen on a hot summer's day ringing the entrance hole of a sand-martin's nest! Both species seem as a rule to live in separate colonies, though they may sometimes be seen together on the same stone. Adult specimens of both species from the cliffs are, at this season, very much weathered at the apex. *J. cylindracea* when living on the cliffs is of a more robust growth and darker in colour than those on the mossy walls inland, where a much longer and usually more delicate and somewhat translucent form occurs. In an old quarry at Lindeth, the stones lying about were studded with shells of this species in all stages of growth, and I counted 107 individuals on a stone measuring about ten inches by eight.

At Woodwell, a charming little dell near the village, masses of *Galium aparine*, growing over some tall bushes to a height of six or eight feet, swarmed with *Hygromia granulata*, which fell into the umbrella by scores when the bushes were beaten. With them were also many half-grown *Helicigona arbustorum*, a species not at all common in this district, nor indeed in the county generally; the largest colony I know of being at Caton, near Lancaster, and it was taken sparingly by Mr. J. W. Jackson in Eggerslack Wood, Grange-over-Sands, in July, 1903, which about completes the record for this side of the County Palatine. The Woodwell shells are of the large, somewhat depressed and richly-coloured dark form one usually associates with *H. arbustorum* when occurring at low altitudes, in this instance certainly not more than twenty-five feet above sea-level. The wealth of molluscan life about Woodwell, with its amphitheatre of trees growing from the talus of huge blocks of limestone fallen from the cliffs above, and overgrown with a thick coating of ivy, moss, and geranium, would astonish a young collector. In the woods around, search underneath the stones and dead branches yielded plenty of *Vitrina pellucida*, *Carychium minimum*, *Vitrea alliaria*, and var. *viridula*, *V. crystallina*, *V. cellaria*, *V. nitidula*, and its vars. *nitens* and *helmi*, *V. pura* and var. *nitidosa*, *V. rogersi*, *Euconulus fulvus*, *Hygromia hispida*, *Cochlicopa lubrica*, and most of the species already mentioned. *Clausilia laminata* and *C. bidentata* are common on the trees and rocks. I took some particularly fine *C. bidentata* var. *cravenensis* on the rocks and wall round the well itself. This large and distinctive form, which some of our continental friends would not hesitate to claim as a good "species," and I should be strongly inclined to agree with them, has always in my experience occurred on rocks and walls, and I have never found it indulging in the arboreal habits so commonly observed in the type.

At a spot called the Cove, on the Silverdale shore, the grassy slopes swarm with *Helicella caperata* of a small form, with very sober colouring, and scarcely a trace of the variation one usually looks for in this pretty little shell. *Pomatias elegans* is common there also, in the wood on the top of the cliff, and many dead shells which have fallen from above, may be found on the beach at the cliff base, or lodged on the ledges. All the living shells found were immature. The first record for this species in the Silverdale district—and for the county—is that by Mr. R. Scharff in the *Journal of Conchology*, vol. 3, p. 178, 1881; and not long afterwards it was taken by Mr. J. Ray Hardy about a mile inland, in a coppice and hedgerow in Ford Lane; and again by Mr. J. B. Dixon, in 1902. It has since then been taken on Humphrey Head (172 feet) on the opposite side of the bay by Mr. C. H. Moore. It also occurs about four miles away at Low Meathop,

Westmorland, in a similar habitat to that at Ford Lane; and is plentiful on the "screes" at the summit of Arnside Knot. It would be interesting to ascertain the source of the trees in the coppices where this species now lives. The plantations do not appear to be much more than half-a-century old, judging from the dimensions of the trees, which are mostly Birch, Beech, Elm, Sycamore, and various Firs, and there seems to be reasonable ground for suggesting that the species has been introduced along with the young trees. In this district *Vallonia excentrica* seems to be the predominant form of the interesting group to which it belongs, though a considerable colony of *V. costata* occurs at the westward base of Warton Crag. *V. pulchella* does not occur to my knowledge anywhere in the district, and I am disposed to think that when the typical characters of the three *Vallonias*, now established on the British list, are better understood, and collectors have become more familiarized with them, it will prove the scarcer one generally throughout the British Isles.

Sinistral *Helicigona arbustorum*.—On October 7th I was fortunate in finding a sinistral specimen of *Helicigona arbustorum*, which Mr. Wright, who was with me at the time, kindly exhibited with his set from Maidwell Dales, Northants. On July 26th, at Duston, near Northampton, I found one specimen of *Helix hortensis* var. *incarnata* with the rare banding in black 00005.—Rev. W. A. SHAW Haselbeeche Rectory, Northampton (*Read before the Society*, November 8th, 1905).

Do Swans and Ducks eat *Anodonta cygnea*?—On reading Mr. L. E. Adams' remarks under the above heading (p. 192) it struck me that the following circumstance might possibly be worth recording. During a stay in the Waveney Valley in the autumn of 1904, I noticed on September 30th, in a sedgy corner of a meadow adjoining the river, in the parish of Wortwell, several specimens of *Anodonta cygnea*, the valves of which had been broken, and the soft parts in many cases more or less completely removed. The grass and sedge at the water's brink were worn and trampled down, as if the spot were frequented by some animal or animals of considerable size and weight, and I thought at the time that otters must have been at work there. On several subsequent visits to the place I always found a good number of these mussels strewn about the ground, a few being quite entire and unbroken, with the animal inside alive; others smashed as to their valves and having a part or the whole of their contents gone. On one occasion I saw some swans (of which there are several about that part of the river) standing and sitting about at this very spot; and though I did not see any of these birds actually engaged in bringing up the mussels from the bottom, I came to the conclusion that they must be in the habit of visiting the place for that purpose. I once watched a party of grey or Royston crows plucking these molluscs out of the mud of the river Alde at low tide, each bird carrying off its prize into the middle of a meadow in order to enjoy it unmolested.—G. T. ROPE (*Read before the Society*, Dec. 13, 1905).

CHRISTIAN HEE HWASS: 1731-1803.¹

Note by C. A. GOSCH, Attaché to the Danish Embassy in London,
communicated by B. B. WOODWARD, F.L.S., &c.

(Read before the Society, December 13, 1905).

DETAILS concerning the personality of the author of the article on the genus *Conus* in the "Encyclopédie Méthodique," in 1792, have long been wanting. Mistaking the name for a Dutch one, I sought in vain. At length a valuable clue was disinterred from a paper by Dr. W. H. Dall¹ "On the genus *Ampullaria*" (*antea*, p. 50). Thus directed to the right, Danish, source the task became simpler, and through the great kindness of my friend Mr. C. A. Gosch, Attaché to the Danish Embassy in London, correct details as to the life of Hwass are now set forth. What the source of Dr. Dall's information may have been I am unaware, but it is evident that the personal histories of father and son have become mixed. B.B.W.

Mr. Gosch's² note is as follows:—

CHRISTIAN HEE HWASS³ was born in 1731. His father was a clergyman, and he qualified himself for the church but never took orders. For some years he was tutor to the sons of a very wealthy merchant of the name of Ancher, and with the eldest son he travelled for two or three years in Sweden, Germany, Italy, France and England. Hwass was a man of varied interests, much refinement and taste, and in 1772 he was made Manager of the Royal Theatre at Copenhagen, which is a state institution, a post which he retained until 1778, when he resigned. Meanwhile he had, through his wife, come into possession of a not inconsiderable fortune, rendering him independent.

In 1780 he left Denmark and settled in Paris. His object in so doing was twofold: first, to procure the best possible education for his son of whom he had great expectations; secondly, to carry out a literary project which had occupied him for several years, viz., a

¹ The data given by Dall, above referred to, were derived from manuscript notes by the late Dr. O. A. L. Mörch, which the former had no opportunity of verifying, and, as coming from a distinguished Danish naturalist, naturally accepted as correct. Bruguère ("Encycl. Méth.," Vers., vi., p. 598) in prefatory remarks on the article *Conus*, says: "Le travail que je présente ici sur les *Cones* m'a été communiqué par M. Hwass, Conseiller de Justice du Roi de Dannemarck, qui a bien voulu le détacher d'un autre plus considérable, actuellement sous presse, qui renferme le catalogue systématique des coquilles précieuses qui compose sa collection." The original drawings for this latter work became the property of Schumacher (*see his* "Essai," p. 205, 1817); also Chemnitz, "Conch. Cab.," xi., p. 211, and Bosc, "Hist. Nat. des Coq.," v., p. 108, 1802, for further notes on Hwass. Chemnitz calls him "Herr Justizrath Hwass," and the term "Consul" used in this connection by the translator employed by Dall to put Mörch's Danish notes into English, is probably a *lapsus* for "Councillor."

² Mr. Gosch is author of that very useful reference book, "Udsigt over Danmarks Zoologiske Literatur," in 4 vols., 8vo. Kjöbenhavn, 1870-78.

³ So he signed himself, but ordinarily the name is spelt "Hvas." I believe there is a branch of that stock in Norway who call themselves "Hwas."

complete edition of the writings of Tycho Brahe, the astronomer. It is known that in 1777 he obtained the loan of the original MSS. of Tycho Brahe from the Royal Library at Copenhagen, and that he returned them in 1778.

In 1787 he visited England with his family, and on this occasion he made arrangements with certain English publishers who were to undertake the publication jointly. The printing is stated to have been begun, but interrupted by the outbreak of the French Revolution. It appears from the statements of Hwass himself, that he hoped to resume this great undertaking in more tranquil times, but he never succeeded in doing so. In a letter to a relative in Denmark, that is still preserved, he says that he and his family had passed through the troubles of the Revolution without suffering any injury, though in Copenhagen it had been reported that he and his son had been killed, and that his wife had had to seek refuge in a convent.

After 1794 he spent the greater part of the year at Auteuil, and finally he settled for good at Passy, where he died in 1803. His widow and son continued to live in the same house until they both died in 1824.

Neither Hwass nor his son Christian Hwass ever occupied any official position. They simply lived on their means. They were both known for their hospitality to Danes who visited Paris.

The father possessed not only a collection of shells, but also a valuable collection of pictures, which he had been able to bring together during the social trouble in France. It is known that his son inherited the pictures, but the same is not known with certainty as regards the shells, but there is no reason for doubting it as far as I am aware.

C. Hwass, Jun., was not married, and at his death, or at any rate at the death of his mother, which took place a few months after his, the whole of his property came into the possession of an old servant of theirs, a certain Mme. Martin. How she came into possession of it is not known; but of course she sold it privately. In fact there was strong suspicion of foul play.

Helicella virgata var. *hypoazona* in the Isle of Wight.—While staying in the Isle of Wight early in October, I visited the downs in the neighbourhood of Freshwater in an unsuccessful endeavour to find *Helicella barbara* L., recorded from there (as *Bulinus acutus*) in the late Mr. C. Ashford's "List of Isle of Wight Mollusca," published a few years ago in *Science Gossip*. Not even a dead shell was to be seen, but on a grassy slope, near the foot of High Down, I found four specimens of *H. virgata* var. *hypoazona*, and as this curious variety does not seem to be one of the most widely distributed forms of *H. virgata*, I have thought the locality worth recording.—F. B. JENNINGS, October 18th, 1905 (*Read before the Society*, November 8th, 1905).

CONTRIBUTIONS TOWARDS A LIST OF WEST-SUFFOLK NON-MARINE MOLLUSCA.

By A. MAYFIELD.

(Read before the Society, November 8th, 1905).

IN the last edition of the "Census of the British Land and Fresh-water Mollusca" only eighteen species are recorded from West Suffolk. In the hope that, with the publication of the next edition of the "Census," vice-county 26 may appear less of a "dark corner," I have compiled the present list and forwarded the shells collected to the Society's referees.

For the purpose of briefly describing the soils and sub-soils, West Suffolk may be conveniently divided into four nearly equal parts, by two lines: one drawn longitudinally from Thetford to Sudbury; the other at right-angles to the former from Newmarket to Stowmarket. Of these four divisions, the north-east (1), south-east (2), and south-west (3), are mainly agricultural, and the land-molluscs inhabiting them chiefly of the hedgerow-loving kinds. The aquatic species are those preferring the ponds, ditches, and other small bodies of water. In the two eastern divisions (1 and 2) the chalk (which forms one continuous stratum under the whole of the vice-county) dips toward the south-east, producing a gradual change southwards and eastwards from light lands upon a subsoil of chalk to heavy lands upon a subsoil of yellowish-grey clay overlying the chalk.

In the south-west division the chalk is covered with layers of sand, gravel and brick-earth. Here is the highest ground of the county, viz., a tableland lying to the south-west of Bury St. Edmunds, the most elevated spot being mid-way between the villages of Rede and Depden, where the elevation reaches 420 feet. This district is, or was, the home of *Ena montana*.

In the north-western division (4) are two distinct districts widely differing from the agricultural lands already mentioned. In the extreme north-west there is a tract of fen-land, called the Mildenhall Fen, varying from two to about twenty feet above sea-level. Here all the more common aquatic species are abundant. East of this fen is another tract of level ground, with an average elevation of 150 feet. Here the chalky subsoil is thinly covered with sand. In a few places agriculture is attempted, the areas broken up for this purpose being called "brecks," on account of which the whole district is known as the "Breck District." For miles, however, the land is solely occupied by rabbit-warrens, covered with short grass, moss, and bracken. A peculiar feature of the Breck district is the occurrence of wild plants, insects, and birds, which are usually to be met with only upon

the grassy denes of the east coast. The most satisfactory theory put forward to explain the phenomenon is that estuarine arms of the Wash formerly extended as far as this neighbourhood, along the valleys now occupied by the Little Ouse and Lark streams. The molluscan fauna is extremely meagre; the only species I have met with on the warrens are *Helicella caperata*, *Vallonia excentrica*, *Jamnia muscorum*, *Vertigo pygmæa*, and *Pisidium gassiesianum*.

Along the valley of the Little Ouse there are patches of peat-land, e.g., at Rushford, Knettishall, Hopton, and Redgrave. At Knettishall the peat is remarkably rich in the fossil remains of freshwater molluscs and those terrestrial species usually inhabiting wet places. This molluscan "cemetery" contains the shells of *Agriolimax lævis*, *Hygromia hispida*, *Cochlicopa lubrica*, *Succinea elegans*, *Acroloxus lacustris*, *Limnæa stagnalis*, *L. pereger*, *L. palustris*, *Planorbis spirorbis*, *P. carinatus*, *P. corneus*, *P. umbilicatus*, *P. albus*, *Bithynia tentaculata*, *B. leachii*, *Physa fontinalis*, *Valvata piscinalis*, and *Pisidium corneum*. All of these species except *Acroloxus lacustris* are equally abundant in or near the neighbouring ditches. For the capture of fluviatile species, the lower parts of the Little Ouse, Lark, and Stour, provide good hunting-grounds. The following list of eighty-three species is certainly not a complete enumeration of all that occur in West Suffolk. Several others have been elsewhere recorded, but I have excluded all records except those of recent date. The species in the list, with the one exception of *Ena montana*, have been met with in the localities mentioned within the last two or three years.

I beg to offer my sincere thanks to Messrs. W. R. and G. W. Church of Bacton, for help in collecting shells from various localities; to Mr. Claude Morley, F.E.S., Ipswich, for a list of species found by him at Brandon and Tuddenham; and to Mrs. Caton and Mr. J. H. Sikes for lists of shells taken at Great Fakenham and Bury St. Edmunds. Records quoted from these lists are marked (M.), (C.), and (S.), respectively. I am also indebted to the Rev. E. M. Bloomfield, of Guestling, near Hastings, for some records of shells found in the neighbourhood of Bury St. Edmunds by the late Mr. Skepper about 1865 and 1866. I have not, however, quoted from this list (except in the case of *Ena montana*) for reasons already mentioned, but I have been guided thereby to several productive localities which would otherwise have been missed.

The numbers placed before locality names refer to the four suggested divisions of the vice-county.

Limax maximus Linné.—(1) Wetherden, Badwell Ash, Elms well. (2) Rougham. (4) Bury St. Edmunds.

L. flavus *Linné*.—(2) Sudbury. (4) Bury St. Edmunds, Mildenhall.

L. arborum *Bouchard-Chantereaux*.—(1) Plentiful at Haughley, on willows. (2) On elm, Rattlesden. (4) Brandon (M.).

Agriolimax agrestis (*Linné*).—Common everywhere except on the warrens of the Breck district.

A. lævis (*Müller*).—In damp places. (1) Wetherden, Great Ashfield, Drinkstone, Knettishall. (2) Sudbury. (3) Whepstead.

Vitrina pellucida (*Müller*).—Common. (1) Great Fakenham (S.), Drinkstone, Thurston, Haughley, Walsham-le-Willows, Elmswell, Wetherden. (2) Felsham, Cockfield, Hitcham, Rattlesden. (3) Whepstead. (4) Hengrave, Bury St. Edmunds, Brandon (M.).

Vitrea crystallina (*Müller*).—Common. (1) Drinkstone, Thurston, Wetherden, Haughley, Wyverstone, Walsham-le-Willows, Knettishall. (2) Hitcham, Buxhall. (4) Brandon (M.), Mildenhall.

V. cellaria (*Müller*).—Common. (1) Great Fakenham (S.), Haughley, Redgrave, Wyverstone. (2) Felsham, Hitcham, Chelsworth, Lavenham. (3) Whepstead. (4) Tuddenham (M.), Bury St. Edmunds (S.).

V. rogersi *B. B. Woodward*.—Common. (1) Wetherden, Drinkstone, Haughley, Walsham-le-Willows, Elmswell. (2) Felsham, Bildeston, Lavenham. (3) Whepstead. (4) Hengrave.

V. alliaria (*Miller*).—Rare. (4) Brandon (M.).

V. nitidula (*Draparnaud*).—Common. (1) Wetherden, Drinkstone, Haughley, Walsham-le-Willows, Great Fakenham (S.). (2) Rattlesden, Felsham, Cockfield, Hitcham, Lavenham. (3) Whepstead.

V. pura (*Alder*).—Rare. (1) Great Fakenham (S.), Haughley.

V. radiatula (*Alder*).—Rare. (1) Haughley. (4) Brandon (M.).

Zonitoides nitidus (*Müller*).—Rather rare. (1) Great Fakenham (S.), Wyverstone. (4) Brandon (M.).

Euconulus fulvus (*Müller*).—Uncommon. (1) Drinkstone, Knettishall. (4) Tuddenham (M.).

Arion ater (*Linné*).—(1) Wetherden, Haughley, Redgrave. (4) Lakenheath (M.).

A. intermedius *Normand*.—Among dead leaves. (1) Wetherden, Haughley, Drinkstone, Knettishall, Wyverstone. (4) Hengrave, Risby.

A. hortensis *Férussac*.—Common everywhere in gardens and under dead leaves.

Punctum pygmæum (*Draparnaud*).—(1) Drinkstone, Haughley, Great Fakenham (S.). (2) Rattlesden.

Sphyradium edentulum (*Draparnaud*).—Rare. (1) Under ivy on old wall at Walsham-le-Willows.

Pyramidula rotundata (*Müller*).—Common. (1) Wetherden, Haughley, Walsham-le-Willows, Great Fakenham (S.). (2) Felsham, Hitcham, Chelsworth. (3) Whepstead. (4) Bury St. Edmunds (S.).

Helicella virgata (*Da Costa*).—Not common. (1) Great Fakenham (S.), Haughley. (2) Lavenham. (4) Bury St. Edmunds, Brandon (M.).

var. **lineata** *Olivi*.—Haughley, Lavenham, Bury St. Edmunds.

var. **maculata** *Moquin-Tandon*.—Great Fakenham (S.).

var. **albicans** *Grateloup*.—Brandon (M.), Great Fakenham (S.), Lavenham, Bury St. Edmunds.

H. itala (*Linné*).—Common. (1) Great Fakenham (S.), Onehouse, Haughley, Wetherden, Elmswell. (2) Great Finborough, Felsham, Cockfield, Rattlesden, Bildeston, Lavenham. (3) Whepstead. (4) Bury St. Edmunds, Lackford.

var. **alba** *Taylor*.—Great Fakenham (S.), Lavenham.

var. **leucozona** *Moquin-Tandon*.—Whepstead, Gt. Finborough.

H. caperata (*Montagu*).—Common. (1) Great Fakenham (S.), Onehouse, Haughley, Wetherden, Elmswell, Walsham-le-Willows, Knettishall. (2) Great Finborough, Felsham, Cockfield, Bildeston, Rattlesden, Hitcham, Chelsworth, Lavenham. (3) Whepstead. (4) Tuddenham (M.), Bury St. Edmunds, Thetford Warren, Santon Downham, Hengrave.

var. **bizonalis** *Moquin-Tandon*.—Elmswell.

var. **ornata** *Picard*.—Great Fakenham (S.), Brandon (M.), Santon Downham, Tuddenham.

H. cantiana (*Montagu*).—Not common. (2) Plentiful at Hitcham, Bildeston, and Chelsworth.

H. cartusiana *Müller*.—(1) A single dead specimen at Great Fakenham (C.). This is the fourth East Anglian locality in which this species has been found.

Hygromia granulata (*Alder*).—(1) Knettishall. (4) Brandon, Tuddenham (M.), Mildenhall, Barton Mills.

var. **cornea** *Jeffreys*.—On the banks of the River Lark at Mildenhall.

H. hispida (*Linné*).—Very common in all the districts except the warrens. The var. **hispidosa** *Mousson* is the prevailing form.

var. **depilata** *Alder*.—(1) Haughley, Redgrave, Walsham-le-Willows. (2) Lavenham.

var. **albida** *Jeffreys*.—(2) Felsham. (3) Whepstead.

H. rufescens (*Pennant*).—Very common, abundant almost everywhere.

var. **rubens** *Moquin-Tandon*.—(1) Walsham-le-Willows. (2) Chelsworth. (3) Whepstead.

var. **alba** *Moquin-Tandon*.—(1) Wetherden. (2) Lavenham. (3) Whepstead. (4) Mildenhall.

Acanthinula aculeata (*Müller*).—(1) Among dead leaves, Haughley, Drinkstone.

Vallonia excentrica *Sterki*.—(1) Knettishall, Westhorpe. (4) Herringswell.

V. costata (*Müller*).—(4) Hengrave, Tuddenham.

Helicigona lapicida (*Linné*).—(1) Great Fakenham (C.). (2) Milden, Chelsworth, Lavenham. (3) Whepstead.

H. arbustorum (*Linné*).—Rare. (4) Mildenhall.

Helix aspersa *Müller*.—Common in all districts.

var. **flammea** *Picard*.—(1) Haughley, Wetherden. (2) Whepstead, Lavenham.

var. **zonata** *Moquin-Tandon*.—(2) Felsham, Lavenham.

H. nemoralis *Linné*.—Moderately common; not so plentiful as *H. hortensis*.

var. **rubella** *Moquin-Tandon*.—(1) Great Fakenham (C.), Redgrave. (4) Mildenhall.

var. **libellula** *Risso*.—(1) 12345, 00300, (12345), 00000, Great Fakenham (C.), Redgrave. (2) Rattlesden, Buxhall, Hitcham, Bildeston, Chelsworth, Lavenham. (3) Whepstead. (4) Tuddenham, Mildenhall.

var. **olivacea** *Risso*.—(4) Mildenhall.

var. **lilacina**.—(1) Great Fakenham (C.).

H. hortensis *Müller*.—Common throughout the agricultural districts.

var. **albina** *Moquin-Tandon*, and var. **lutea** *Moquin-Tandon*.—(1) Onehouse, Haughley, Walsham-le-Willows, Ixworth, Ixworth Thorpe, Wetherden, Elmswell. (2) Rattlesden, Great Finborough, Felsham, Cockfield, Hitcham, Bildeston, Chelsworth, Milden, Lavenham. (3) Whepstead. (4) Bury St. Edmunds.

var. **incarnata** *Moquin-Tandon*.—(2) Lavenham.

Ena montana *Draparnaud*.—This species has been found in several spots on the high lands south-west of Bury St. Edmunds. The late Mr. Skepper records in 1866:—"Twenty specimens among dead beech leaves, Drinkstone Park; two specimens, Hartest." I have searched for it several times and in various places in the neighbourhood, but up to the present I have been unsuccessful.

E. obscura *Müller*.—Not common. (1) Walsham-le-Willows, (2) Chelsworth, Felsham.

Cochlicopa lubrica (*Müller*).—Common. (1) Great Fakenham (S.), Haughley, Elmswell, Knettishall. (2) Chelsworth. (4) Tuddenham (M.), Bury St. Edmunds, Hengrave, Mildenhall.

Jaminia cylindracea (*Da Costa*).—(1) Haughley, Walsham-le-Willows. (4) Hengrave.

J. muscorum (*Linné*).—(1) Knettishall. (4) Brandon, Tuddenham (M.), Santon Downham, Thetford Warren, Herringswell.

Vertigo antivertigo (*Draparnaud*).—Rare. (4) Brandon (M.), Mildenhall, dead shells.

V. pygmæa (*Draparnaud*).—(1) Haughley. (4) Tuddenham (M.), Herringswell.

Balea perversa (*Linné*).—Rare. (1) On old wall, under ivy, at Walsham-le-Willows.

Clausilia laminata (*Montagu*).—Rare. (1) Haughley. (2) Hitcham.

C. bidentata (*Ström.*).—Common. (1) Haughley, Wetherden, Elmswell, Westhorpe, Walsham-le-Willows. (2) Rattlesden, Hitcham. (3) Whepstead. (4) Hengrave.

var. **everetti** *Miller*.—(1) Haughley, Walsham-le-Willows.

Succinea putris (*Linné*).—(1) Redgrave, Knettishall. (2) Sudbury. (4) Brandon (M.).

S. elegans *Risso*.—(1) Great Fakenham (S.), Redgrave, Walsham-le-Willows. (2) Lavenham, Sudbury, Chelsworth. (4) Tuddenham (M.), Mildenhall, Barton Mills.

Carychium minimum *Müller*.—(1) Drinkstone, Wyverstone. (2) Rattlesden. (4) Brandon (M.), Hengrave, Mildenhall.

Ancylus fluviatilis *Müll.*.—Rare. (4) Brandon (M.), Mildenhall.

Acroloxus lacustris (*Linné*).—Rare. (1) Great Fakenham (S.), Knettishall, dead shells. (2) Sudbury.

var. **albida** *Jeffreys*.—Great Fakenham (S.).

Limnæa auricularia (*Linné*).—(1) Great Fakenham (S.) (2) Sudbury. (4) Mildenhall.

L. pereger (*Müller em.*).—Common. (1) Great Fakenham (S.), Wetherden, Westhorpe, Redgrave, Walsham-le-Willows, Knettishall, Great Ashfield, Wyverstone. (2) Lavenham, Sudbury. (4) Bury St. Edmunds (S.), Brandon (M.), Lackford, Mildenhall, Barton Mills.

L. palustris (*Müller*).—(1) Great Fakenham (S.), Redgrave, Knettishall. (2) Sudbury. (4) Bury St. Edmunds (S.), Brandon (M.), Mildenhall.

L. truncatula *Müller*.—(1) Great Fakenham (S.), Haughley, Wetherden, Wyverstone, Knettishall. (2) Lavenham, Sudbury. (4) Brandon (M.), Mildenhall.

L. stagnalis (*Linné*).—(1) Great Fakenham (S.), Knettishall, Walsham-le-Willows. (2) Sudbury. (4) Brandon (M.), Bury St. Edmunds, Mildenhall.

Planorbis corneus (*Linné*).—(1) Great Fakenham (S.), Redgrave, Knettishall. (2) Sudbury. (4) Brandon (M.), Mildenhall.

P. albus *Müller*.—(1) Great Fakenham (S.), Knettishall (2) Sudbury, abundant. (4) Brandon (M.), Mildenhall, Barton Mills.

P. carinatus *Müller*.—(1) Great Fakenham (S.), Redgrave, Knettishall. (2) Lavenham, Sudbury. (4) Brandon (M.), Bury St. Edmunds (S.), Mildenhall, Barton Mills.

var. **disciformis** *Jeffreys*.—Great Fakenham (S.), Knettishall.

P. umbilicatus *Müller*.—(1) Redgrave, Knettishall. (2) Lavenham, Sudbury. (4) Mildenhall, Barton Mills.

P. vortex (*Linné*).—(1) Great Fakenham (S.), Redgrave, Knettishall. (2) Sudbury. (4) Brandon (M.), Bury St. Edmunds (S.), Lackford, Mildenhall, Barton Mills.

P. spirorbis (*Linné*).—(1) Haughley, Wetherden, Westhorpe, Walsham-le-Willows, Redgrave, Wyverstone. (2) Lavenham. (4) Mildenhall.

P. contortus (*Linné*).—(1) Redgrave, Knettishall. (2) Sudbury. (4) Brandon (M.), Lackford.

P. fontanus (*Lightfoot*).—(1) Knettishall. (2) Sudbury. (4) Mildenhall.

Segmentina nitida (*Müller*).—Rare. (4) Mildenhall.

Physa fontinalis (*Linné*).—(1) Great Fakenham (S.), Wyverstone, Knettishall. (2) Sudbury. (4) Brandon (M.), Mildenhall.

Aplecta hypnorum (*Linné*).—(1) Haughley, Wetherden, Wyverstone. (4) Tuddenham (M.).

Bithynia tentaculata (*Linné*).—(1) Great Fakenham (S.), Redgrave, Knettishall. (2) Milden, Sudbury. (4) Brandon (M.), Lackford, Mildenhall.

var. **producta** (*Menke*).—Great Fakenham (S.).

B. leachi (*Sheppard*).—(1) Great Fakenham (S.), Knettishall, abundant. (2) Sudbury. (4) Brandon (M.), Mildenhall.

Vivipara contecta (*Millet*).—(1) Great Fakenham (S.), Redgrave, Knettishall. (2) Sudbury. (4) Mildenhall.

Valvata piscinalis (*Müller*).—(1) Great Fakenham (S.), Knettishall. (2) Sudbury. (4) Mildenhall.

V. cristata Müller.—(1) Great Ashfield, Knettishall. (2) Sudbury, (4) Brandon (M.), Mildenhall, Barton Mills.

Pomatias elegans (Müller).—Rare. (2) On a hedgebank at Lavenham.

Neritina fluviatilis (Linné).—Rare. (4) Brandon (M.), Mildenhall.

Unio pictorum (Linne).—(1) Gt. Fakenham (S.). (4) Mildenhall.

Anodonta cygnæa (Linné).—(1) Great Fakenham (S.). (2) Sudbury. (4) Mildenhall.

var. **anatina** Linné.—Mildenhall.

Sphærium corneum (Linné).—Common. Great Fakenham (S.), Redgrave, Walsham-le-Willows, Knettishall. (2) Sudbury, Lavenham. (4) Mildenhall.

var. **flavescens** Macgillivray.—Knettishall, Sudbury.

var. **pisidioides** Gray.—Lavenham. Great Fakenham (S.).

S. lacustre (Müller).—(1) Great Fakenham (S.), Walsham-le-Willows. (4) Mildenhall.

Pisidium amnicum (Müller).—(1) Great Fakenham (S.). (4) Brandon (M.), Mildenhall, Barton Mills.

P. pusillum (Gmelin).—(1) Haughley, Wetherden, Wyverstone. (2) Hitcham. (4) Brandon (M.).

P. obtusale Pfeiffer.—(1) Haughley, Wyverstone. (2) Lavenham, Sudbury.

P. gassiesianum Dupuy.—Rare. (4) Santon Downham. In a ditch on Thetford Warren.

British Species of Vallonia.—I can confirm Mr. B. B. Woodward's remark (*antea*, p. 82) that the embryonic shell in British specimens of *Vallonia costata* is smooth. The embryonic whorls of living shells collected in marshy ground, where there would be no likelihood of the costæ being abraded, were just as smooth as the nucleus of *V. pulchella*, when viewed under a one-inch objective. So far I have not succeeded in taking all three forms of *Vallonia* together, though I have found *V. pulchella* with *V. costata* at Llandudno, and *V. costata* with *V. excentrica* at Aldeburgh and near Chiswick. In the Holocene deposit at Uxbridge, however, Mr. A. Loydell has noted all three together. It may be heresy to say so, but I think that *V. excentrica* will eventually be considered merely a variety of *V. pulchella*. My reason for saying this is that if a good series of the two forms is taken, it is quite possible to grade one into the other. Until the shell is nearly mature, there is no difference between the two, and the eccentricity of the body-whorl seems to be a very variable quantity. It would be interesting to have other members' views on this point.—J. E. COOPER (*Read before the Society*, Dec. 13th, 1905).

AN ATTEMPT TO BREED FROM A SINISTRAL HELIX POMATIA,

With Notes on the Reproduction of the Dart.

By J. WILFRID JACKSON.

(Read before the Society, December 13th, 1905).

ON May 10th, 1904, I received from Mr. F. B. Jennings, of London, a very fine and almost full-grown sinistral specimen of *Helix pomatia* which a friend of his had had the good fortune to find at Box Hill, Surrey, on the 1st of the month. In coming through the post the lip of the shell was unfortunately fractured, but the snail eventually made this good. After exhibiting the specimen at one of the meetings of the Conchological Society I entered into negotiations with Mr. Jennings with a view to retaining possession of the snail for breeding experiments, and Mr. Jennings very kindly allowed me to keep it. As he had also sent me a living dextral specimen I decided to make experiments with them after the manner adopted by Mr. R. Standen¹ with a sinistral *Helix aspersa* some years ago.

The following are the more interesting notes from my diary, and for convenience I have adopted the abbreviations as under:—*D*=dextral snail; *D.S.*=dart sac; *S.*=sinistral snail; *G.O.*=generative organ.

MAY 14TH, 1904.—Placed both snails in a large glass tank bedded with earth, pieces of chalk, and limestone mortar. Put in a supply of cabbage leaves which the snails commenced to devour at once. Noticed *S.* had repaired its shell.

MAY 15TH.—Noticed very strong desire to pair on the part of both snails. Animals in peculiar position, foot-sole to foot-sole, and standing erect on tips of tails, and fondling each other with tentacles and palpi; mouths also in close contact. Snails emitting a curious sibulant smacking sound. *G.O.* of *D.* protruded forcibly towards base of right tentacle of *S.*, but genital aperture being on left side in *S.* coition impossible.

MAY 16TH.—Snails have evidently been very active during night. Quantity of thick slime about. Found one dart in mass of mucus. Dart perfectly formed with exception of annulus which is missing. In the evening noticed *D.* was partly out of shell and had turned back its head and was gnawing away at the aperture of its own shell, the noise being quite audible. Later—both snails feeding quietly.

MAY 23RD.—Snails very active and feeding voraciously on lettuce, *S.* occasionally eating limestone mortar.

¹ *J. Conch.*, vol. 7, p. 33.

JUNE 2ND.—Snails lovemaking again with bodies raised and fondling each other exactly as on first occasion. G.S. of both protruded. *S.* extended D.S. downwards projecting and withdrawing dart very rapidly for some time, but did not strike *D.* with it. *D.* then projected dart rapidly and withdrew it slowly. Organ extended 0.75 inch. *S.* then became very active and rearing above *D.* slowly forced it back into its shell until only tips of tentacles were visible. G.O. much exerted but dart not used. *D.* then forced *S.* over in same way and projected D.S. slowly against right side of *S.*—dart protruded nearly to annulus.

LATER.—Both very much excited and projecting darts simultaneously, crossing them repeatedly with a thrusting motion. Then heads of each came side by side, *S.* thrusting dart wildly into space. About an hour afterwards they adopted peculiar attitudes; foot-soles pressing tightly together and bodies raised until the snails were standing quite 3.5 inches high on their tails. G.O. in each in rapid motion. They then bent over sideways until their heads nearly touched the ground, and from that position they slowly regained the vertical again. At 8 p.m. snails separated; *D.* crawled away and began feeding, *S.* quiet.

LATER.—Snails together again in same corner of tank. G.O. not protruded at first, but snails afterwards became very active, *S.* using dart freely, and *D.* receiving a vigorous stab, suddenly withdrew into its shell, exuding a quantity of mucous, carrying with it the dart from *S.*, which had slightly penetrated the skin just below the left tentacle. Dart afterwards came floating out in the mucus. *S.* appeared to take little notice of the loss of its dart, and did not retire into its shell.

JUNE 3RD.—Snails still in same position as when last observed, but towards noon they separated. *D.* very sensitive; *S.* sluggish; both inclined to feed.

JUNE 4TH.—Snails together again nearly all day. No signs of effective pairing observed. On separating, both ascended to cover-glass, and became quiescent. Fragment of dart found adhering to lettuce leaf. Noticed that *S.* had increased its shell considerably—in fact, 0.5 inch—and had also formed its lip.

JUNE 5TH.—Observed *S.* eating limestone mortar.

JUNE 16TH.—After resting from the 6th instant, snails commenced love-making again, and kept this up for fully three days, going through exactly the same peculiar movements as on previous occasions. At one time *S.* thrust its dart into G.O. of *D.*, driving *D.* backwards, and *D.* retaliated by thrusting G.O. into the mouth of *S.*

JUNE 18TH.—Found one whole dart and the fragment of another in a mass of mucus.

From this date the snails became very inactive, often spending weeks at a stretch suspended from the cover-glass of tank by a thin film of white mucous round mouth of shell. One or other of them would occasionally crawl round tank, and once I noticed *S.* had turned back its head, and was gnawing the lip of its shell, in the same manner as I had seen *D.* doing early on in the year.

On October 4th I put both snails away in a wooden glass-lidded box, with soil at bottom, to hibernate. I examined them again on November 24th, and noticed that *S.* had formed a thin white opaque film within the aperture of the shell. This was stretched tight across, and in the middle there was a thick strip of mucus by which the shell was suspended from the glass. At the junction of this strip with the white epiphragm there was a dark red blotch resembling blood. The white film mentioned above was not the usual winter epiphragm this species makes, but was quite thin, and more like parchment. This may have been brought about by keeping the snails indoors, as I can hardly see that it could be from want of lime, as I kept box and tank well supplied.

On March 12th, 1905, I noticed *D.* had formed a thin white epiphragm, like that of *S.*, but much further in the shell. On April 16th, I cleaned out the old tank, and prepared it again for the snails. About an hour after I had put them in I noticed that *S.* had revived, and was crawling about and eating freely; *D.*, however, remained dormant.

I put in some fresh food on April 30th, and as *D.* was still dormant, I took it out and examined it, and found the epiphragm was broken, the snail evidently having been out. On touching a portion of its foot, which was protruding from the shell, it made very feeble movements. On May 9th I found *D.* dead; *S.* was in good condition and fairly active. From this date onwards there was nothing special to record, as my experiments were practically at a stand-still.

I wrote to several friends for living *Helix pomatia*, but it was not until September 17th that I received several specimens, through the kindness of Mr. A. G. Stubbs. These I introduced to the tank, and they at once commenced to crawl round, being afterwards joined by *S.* *S.* looked very thin, and crawled along with difficulty. On looking closely at it, I noticed an injury to the edge of the mantle, and that g.o. was much swollen and protruding slightly. It did not live long after this, for on going to the tank on Sept. 24th I found it dead.

I was keenly disappointed at this loss, as I had prepared for photographing by flashlight the extremely curious and interesting movements observable in the snails during lovemaking. Early on in their attempts at pairing, not having a camera at the time, I made one or

two rough drawings of the snails in the position of foot-sole to foot-sole and organs extended. These drawings I have given to Mr. J. W. Taylor, as he thinks they may be of use to him in his Monograph.

Although the attempt to effect a union between a sinistral and dextral *Helix pomatia* was not successful, the observations I made are not uninteresting as shewing the method adopted by this species in pairing, and also how soon a new dart may be formed when one is lost. The nearest approach to actual coition occurred when *S.* exerted G.O. and D.S. and thrust dart into G.O. of *D.* The genital organs on this occasion were close together and almost merging into each other.

The use of the Helicine dart was fully demonstrated on each of these occasions and confirmed the opinion held by most naturalists nowadays that its function is to induce excitement prior to sexual union. In all I obtained five darts, only three, however, being perfect; the time occupied in their renewal being from twelve to fourteen days. This time, however, is the time which elapsed between each of their attempts at pairing, and the formation of the dart may, of course, have been completed in less than twelve days.

Both snails were infested with mites which ran all over the body and in and out of the branchial orifice without the slightest heed being paid by the snails. The only time that they appeared to notice them was when a mite ran along the tentacle and over the eye, when the snail would give a slight twinge and withdraw its tentacle. This I observed more than once.

Having in mind Dr. Scharff's query in this *Journal* (vol. 4, p. 310) as to whether molluscs are able to distinguish sounds, or merely concussions, in order to be aware of danger, on several occasions I gave the glass tank a sharp knock when the snails were going through their curious actions, and on each occasion they instantly withdrew their heads and tentacles and remained quiescent for a short time, still retaining the position of foot to foot. I am inclined to think that it was more the concussion than the sound which affected them, as the snails were subjected to plenty of sounds and noises of one kind or another, which they did not appear to notice. No doubt the high pitch of excitement to which the snails had worked themselves would materially affect them on these occasions and tend to make them more sensitive than usual.

Regarding the sense of smell in these creatures I noticed that the snails in many instances lowered their tentacles when eating, but whether for purposes of sight or smell I cannot say (see this *Journal*, vol. 4, p. 312).

With reference to the growth of the shell in the case of the sinistral specimen, I can only say that to all appearances this was put on during the snail's active movements, as there was no indication of its having buried itself for the purpose, although this appears to be the rule (see A. H. Cooke, "Molluscs and Brachiopods, Cambridge Nat. Hist.," p. 40).

In concluding my observations I wish to tender my best thanks to Mr. R. Standen for his kindly help and advice, and also for looking after the snails on one occasion when I was absent from home.



The Occurrence of the White Form of *Helicigona lapicida* (L.).—The occasion of this special exhibit of white varieties of British land and freshwater shells affords a good opportunity for enumerating some specimens of *Helicigona lapicida* var. *albina* not hitherto recorded. In my collection I have a number of this form, which were presented to me by Mr. R. D. Darbishire in 1901. These he tells me were collected by him some fifty years ago on a rough wall in the Zoological Gardens, Regents Park. From Mr. Darbishire I have also a white specimen, labelled "Matlock," which he says he obtained many years ago on some old walls on the hill-side to the northward of Monsal Dale Station, Derbyshire. On reference to the pages of this *Journal*, I notice a number of records of the white form of this species taken in recent years, and for the sake of ready reference I append the list, including a few records from other sources:—1880. RIMMER, R. "The Land and Freshwater Shells of the British Isles" [Went Vale, Yorks. (Hebden); Reigate (Saunders)]. 1883. HELE, F. M. (Miss)—*J. Conch.*, vol. 4, p. 27 [One specimen found near Leigh Court]. 1885. FITZGERALD, H. PUREFOY—*Id.*, p. 337 [Two specimens obtained at Preston Condoover, N. Hants.]. 1887. PEARCE, Rev. S. SPENCER—*J. Conch.*, vol. 5, p. 255 [Taken on several occasions during 1883, and again in 1887, in the vicinity of Wells, Somersetshire]. 1888. MELVILL, J. COSMO—*J. Conch.*, vol. 5, p. 316 [Two specimens in his collection from Matlock, collected by Mr. Thomas Glover, of Manchester, who found a colony of them on Aug. 16th, 1879]. 1893. MILNES, Rev. HERBERT—*J. Conch.*, vol. 7, p. 278 [Matlock, one specimen (H. E. Craven); two specimens (T. Glover, 1879); three specimens, (G. W. Chaster, 1892)]. 1896. ADAMS, LIONEL E.—*J. Conch.*, vol. 8, p. 167 [One specimen collected by Mr. H. Westley at Ewell, near Dover, in 1895]. *Tom. cit.*, p. 228 [One dead specimen found by Mr. A. Loydell at Brackley, Northamptonshire]. 1896. ADAMS, LIONEL E.—"The Collector's Manual of British Land and Freshwater Shells" [One specimen taken by himself at Ewell, near Dover, on trunk of Birch; says form is rare]. 1904. BEESTON, H. and WRIGHT, C. E.—*J. Conch.*, vol. 11, p. 81 [Give the percentage of the white form at Lynmouth as $3\frac{1}{2}$ per cent.]. Messrs. F. Taylor and T. Whitehead also exhibited a number of this form from Lynmouth at the Conchological Society's meeting in September, 1905. These were collected during the previous month. Messrs. R. Standen and J. Ray Hardy both possess specimens from Matlock, collected by Mr. Thomas Peace. It would appear from this list that the white form has become more common in recent years, since, as pointed out by Mr. Melvill (*J. Conch.*, vol. 5, p. 316) it was apparently unknown in this country when Jeffreys published his "British Conchology" (1865).—J. WILFRID JACKSON (*Read before the Society*, February 14th, 1906).

WEST LANCASHIRE NON-MARINE MOLLUSCA: MORECAMBE AND DISTRICT.

By H. BEESTON.

(Read before the Society, November 8th, 1905).

THE following list has been compiled from notes and observations made during a ten days' visit in the month of August, 1905, to Morecambe and district.

The area explored—only a comparatively small one—extends from Heysham, about two miles south of Morecambe, to Bolton-le-Sands, four or five miles to the north-east, and as far inland to the east and south-east as the right bank of the river Lune.

Geologically considered, the district seems of little interest to the conchologist, the soil consisting for the most part of boulder clay and drift materials, and when compared with the country lying to the north and north-west across Morecambe Bay, where the mountain limestone formation is much more in evidence, appears somewhat poor in molluscan fauna; the number of species found being comparatively few, especially of the genera *Vertigo*, *Jamania*, *Balea*, etc. The results were very meagre and disappointing. Probably more diligent search under suitable hygrometrical conditions would result in a larger number of the smaller shells being found, as the last Census List (1902) shows a fairly large proportion of the genera mentioned recorded for West Lancashire, of which the district around Morecambe forms a part.

The slugs also were conspicuous by their absence, the only one which appeared at all common being the black slug, *Arion ater*.

Of the terrestrial snails, eighteen species were identified, and of the freshwater fifteen species, but of the latter the Lancaster and Preston Canal, which runs from Lancaster through Bolton-le-Sands and Carnforth, accounted for nine, leaving six other species confined to the ditches and ponds elsewhere.

A curious fact connected with these water shells is that not a single species found in the canal was to be found in the ditches or ponds in other parts of the district; while those species common to the ditches were absent from the canal. This may have been only a coincidence, as further search in the locality may alter this seemingly anomalous circumstance. The point is merely mentioned for what it is worth, but it would be interesting to know whether conchologists working in other parts of the country have met with a similar experience at any time.

Of the land shells, the only one at all common was *Hygromia rufescens*, which, although small, seemed to be the tenant of almost

every hedgerow and roadside bank, the varieties *rubens* and *albo-cincta* being more abundant than the type. *Helix nemoralis* turned up in two places only, the variety *rubella* predominating; and of *H. hortensis* only a single specimen was discovered. *H. aspersa* seemed fairly well distributed, but not at all abundant anywhere, the variety *albo-fasciata* occurring tolerably frequently; this species, together with *H. rufescens*, was certainly the commonest shell in the district.

The genus *Vitrea* it will be seen from the appended list is fairly represented, three species being found, viz., *cellaria*, *alliaria*, and *nitidula*. Of *Pyramidula rotundata* three specimens were all that rewarded our search, and in one locality only. *Helicella* is represented by one dead shell, viz., *caperata*; but *Hygromia* furnished three species, one of which, *Hy. granulata*, constitutes an addition to the Census List for Vice-County 6o.

Helicigona arbustorum appears to be rare, four shells only, two of which are variety *flavescens*, rewarding a search of nearly half-a-day. One dead specimen of *Cochlicopa lubrica* was all that could be found; and of the genus *Clausilia* the only representative is *bidentata*.

Succinea putris was found in only one locality—a damp ditch by the roadside—crawling on the leaves of *Veronica beccabunga* (the brooklime) the shells being dwarfed and few in number. *Limnæa pereger* and *L. palustris* were obtained sparingly from the ditches in the meadows lying to the east of the town of Morecambe, but as the soil is of a peaty character, the shells were small in size and somewhat thin in texture. In the Lancaster and Preston Canal *Neritina fluviatilis*—possibly the very commonest shell in the district—was found in great abundance. The stones in the shallow water near the sides were crowded in places with the molluscs which were even crawling about on the mud at the bottom. Nearly all the shells of this species were either badly eroded all over, or thickly incrustated with a deposit of lime, and appeared quite white as the animals crawled about on the stones. Scarcely a shell was perfect, and only the very youngest showed the markings distinctly. In consequence, too, of this erosion (or incrustation) the shells had a curiously distorted and mis-shapen appearance, being very thick and heavy, thus favouring the idea of being incrustated rather than of being eroded.

Dreissensia polymorpha was not at all abundant, and instead of being found in clusters and great abundance, as is generally the case, the shells were attached singly to stones on the bed of the canal. On the stonework of the bridges, where the shells are usually found in great quantities, not one could be found. *Anodonta cygnea*, with its variety *anatina*, now finally reduced from specific rank to that of a variety, was common in the canal, but not attaining a very large

size, the largest obtained measuring $4\frac{5}{6}$ by $3\frac{1}{2}$ inches. Of *Sphaerium*, only *S. corneum* (single valves) can be recorded, except one immature specimen; and *Pisidium amnicum* was the sole representative of this genus.

The figures prefixed to the species refer to the numbers as found in the Conchological Society's "List of British Non-Marine Mollusca," published in 1904, and the nomenclature used is that of the same list. Species not recorded in the last Census List are marked with an asterisk (*); these have been submitted to the Society's Recorder, Mr. Charles Oldham, to whom I am indebted for looking over the specimens collected and rendering valuable assistance to me in completing the annexed list.

TERRESTRIAL SPECIES.

No. in Conch. List.

7. **Agriolimax agrestis** (*Linné*).
var. **albida** (*Picard*).—Lane leading to canal from Torresholme.
14. **Vitrea cellaria** (*Müller*).
var. **complanata** *Jeffreys*.—Torresholme; Bolton-le-Sands.
16. **V. alliaria** (*Müller*).—Fields between Heysham and River Lune.
17. **V. nitidula** *Draparnaud*.—By-road to canal from Torresholme.
24. **Arion ater** (*Linné*).—Common along canal side at Hest Bank, and Bolton-le-Sands.
33. **Pyramidula rupestris** (*Draparnaud*).—Wall at Bolton-le-Sands.
34. **Pyr. rotundata** (*Müller*).—Upper Heysham.
39. **Helicella caperata** (*Montagu*).—Road-side bank near Heysham (one dead shell).
- *45. **Hygromia granulata** (*Alder*).—Canal-side at Bolton-le-Sands (one specimen only).
46. **Hyg. hispida** (*Linné*).—Heysham.
var. **depilata** *Alder*.—Torresholme.
var. **hispidosa** *Mousson*.—Canal-side, Bolton-le-Sands.
49. **Hyg. rufescens** (*Pennant*).
var. **rubens** *Moquin-Tandon*.—Bolton-le-Sands; Heysham; Torresholme.
var. **depressa** *Taylor*.—Bolton-le-Sands, (one specimen).
var. **albo-cincta** *Cockerell*.—Heysham.
58. **Helicigona arbustorum** (*Linné*).
var. **flavescens** *Moquin-Tandon*.—Canal-side at Bolton-le-Sands (three specimens).

No. in Conch. List.

59. **Helix aspersa** Müller.—Heysham ; Torresholme.
 var. **flammea** Picard. — By-road to canal from Torresholme (one specimen).
 var. **albo-fasciata** Jeffreys.—Same locality (two specimens).
61. **H. nemoralis** Linné.—Heysham ; canal-side at Bolton-le-Sands ; road from Heysham to Torresholme.
 var. **rubella** Moquin-Tandon.—Canal-side, Bolton-le-Sands.
Bandings: 00000, 12345, (12)345, (123)(45), 123(45), 12345, (12)3(45), :2345, 12345, 1(23)(45), (12)345 (seven-teen shells).
 var. **libellula** Risso.—Canal-side, Bolton-le-Sands ; road from Heysham to Torresholme. *Bandings*: 00000, 00300, 12345, 12345, :2345, (123)(45), 0234:, (12)3(45); (thirteen shells).
 var. **bimarginata** Moquin-Tandon.—Ten shells of varieties *rubella* and *libellula* were of this form.
 var. **undulata** Gentiluomo.—Canal-side at Bolton-le-Sands ; (five specimens).
62. **H. hortensis** Müller.—By-road to canal from Torresholme ; (one specimen only).
70. **Cochlicopa lubrica** (Müller).—Canal-side near Hest Bank ; (one dead shell).
76. **Jaminea cylindracea** (Da Costa).—Torresholme ; Bolton-le-Sands.
 var. **curta** (Westerlund).—Wall at Bolton-le-Sands.
92. **Clausilia bidentata** (Ström).—Found with No. 76 in the same localities.

 AQUATIC SPECIES.

95. **Succinea putris** (Linné).—One or two small shells in a damp ditch, crawling on *Veronica beccabunga*, in the by-road from Torresholme to the canal.
104. **Limnæa pereger** (Müller em).—Ditches near Heysham.
107. **Lim. palustris** (Müller).—Ditches near Heysham.
 var. **lacunosa** Ziegler. — Ditches near Heysham ; (one specimen).
113. **Planorbis albus** (Müller).—Canal, Bolton-le-Sands.
120. **Pl. umbilicatus** Müller.—Ditches near Heysham.
121. **Pl. vortex** (Linné).—Same locality as 120.
123. **Pl. spirorbis** (Linné).—Same locality as 120.
127. **Physa fontinalis** (Linné).—One specimen only in the canal, Bolton-le-Sands.

138. **Bithynia tentaculata** (*Linne*).—Canal at Hest Bank, and Bolton-le-Sands.
143. **Valvata piscinalis** (*Müller*).—Same localities as 138.
148. **Neritina fluviatilis** (*Linné*).—Same localities as 138. Shells badly eroded, markings almost obliterated, and only discernible in young specimens.
- *150. **Dreissensia polymorpha** (*Pallas*).—Same localities as 138. Found singly attached to stones on the bottom, and not on the sides, of the bridge walls, where they are usually found clustered thickly. Like *Neritina fluviatilis*, the shells were badly eroded, the posterior end of the shells being chalky-white through erosion and loss of epidermis.
155. **Anodonta cygnea** (*Linné*).—Canal, Bolton-le-Sands.
- * var. **anatina** *Linné*.—With type.
- *158. **Sphærium corneum** *Linné*.—Canal, Bolton-le-Sands. Only single valves and one immature shell found.
161. **Pisidium amnicum** (*Müller*).—Canal, Bolton-le-Sands. One shell only.



PROCEEDINGS OF THE CONCHOLOGICAL SOCIETY OF GREAT BRITAIN & IRELAND.

351st Meeting, April 11th, 1906.

Mr. Edward Collier (vice-president) in the chair.

Donations to the Library announced and thanks voted :

The usual periodicals received in exchange.

Donation to the Illustration Fund by Sir Charles Eliot, K.C.M.G., £1 5s.

New Members Elected.

J. W. Boulton, 50, Waslington Street, Newland, Hull.

V. B. Crowther-Beynon, M.A., F.S.A., The Grange, Edith Weston, Stamford.

Harry Fogerty, 21, Henry Street, Limerick.

Robert Godfrey, M.A., 46, Cumberland Street, Edinburgh.

Alexander Reynell, 152, Selhurst Road, South Norwood, London, S.E.

C. J. Sharp, M.R.C.S., 2, Wellington Avenue, Liverpool.

Commander E. R. Shopland, Weeting, Sheringham, Norfolk.

Edward Step, F.L.S., Oakwood House, Ashstead, Surrey.

Lt.-Col. W. H. Turton, D.S.O., R.E., Harley House, Clifton Down, Bristol.

Candidates Proposed for Membership.

Francis Edward Adams, Carysfort, Shrewsbury.

Mrs. Emily J. Climençon, Shiplake Grange, Henley-on-Thames.

Miss Grace M. Grint, 33, Goring Road, Bowes Park, London, N.

Charles M. Hall, 33, Goring Road, Bowes Park, London, N.

Alexander Macindoe, M.D., D.P.H., Sidmouth, Devon.

Marchese di Monterosato, 2, Via Gregorio Ugdalena, Palermo, Sicily.

Percy E. Radley, F.R.M.S., 30, Foxgrove Road, Beckenham, Kent.

John Ritchie, jr., Box 2795, Boston, Mass., U.S.A.

M. M. Schepman, Rhoon near Rotterdam, Holland.

Resignation.

H. Bolton, F.R.S.E.

Member Deceased.

Mrs. J. Fitzgerald.

Papers Read.

"Conchological Notes from Japan," by Lionel E. Adams.

"Notes on British Land and Freshwater Shells in the Collection of the late Thomas Glover," edited by his daughter, M. Glover.

"Further Note on French Shell Names," by J. Wilfrid Jackson.

"*Vertigo alpestris* in Westmorland," by J. Wilfrid Jackson.

Exhibits.

By Mr. Charles Oldham: *Testacella haliotideae*, Adlington, Cheshire.

By Mr. John Roseburgh: *Helicigona arbustorum*, 1,600 feet above sea-level, near Loch Skewe, Dumfriesshire. A collection of shells from the counties of Roxburgh and Selkirk, including the following, which are new county records:—ROXBURGH—*Planorbis nautilus*, Faugh Hill Moss; *Vallonia excentrica*, Easter Langlee; *Hyalinia fulva*, Ellwyn; *Sphyradium edentulum*, Ellwyn; *Helicella caperata*, Melrose Road, Joppa; *Sphaerium corneum*, Housebyres Moss; *Anodonta cygnea*, River Tweed, Rutherford Ferry. SELKIRK—*Helicigona arbustorum*, Selkirkshire; *Sphaerium corneum* and *S. nucleus* Selkirk Common; *Helix aspersa*, *H. hortensis* Galashiels (in gardens); *Helicella caperata* Galafool; *Acroloxus lacustris* Pot Loch; *Clausilia bidentata* Caddon Fool. DUMFRIES—*Helicigona arbustorum* Grey Mare's Tail.

By Mr. F. Taylor: A number of beautiful drawings of species and varieties of British non-marine shells, by Mr. A. G. Stubbs.

By Mr. R. Cairns: *Bulinus maritziensis* Pfr., from Venezuela.

By Mr. J. Wilfrid Jackson: A series of French *Helices* to illustrate his note. Also a series of dwarf forms of *Cypraea* including *C. lucida*, 24 × 13 mm., *C. pulchra*, 26 × 15 mm., *C. arabica*, 25 × 15 mm., *C. stercoraria* v. *rattus*, 34 × 21 mm., *C. turdus*, 19.5 × 13.5 mm., *C. erosa* v. *nibrites*, 20 × 13 mm., *C. lynx*, 21.5 × 13.5 mm., *C. carneola*, 18.5 × 13 mm., *C. caput-serpentis*, 21 × 16 mm., *C. caurica* v. *oblongatana* Melv., 22 × 13 mm., principally from East Indian localities.

Series of *Vallonia* from many localities were exhibited by the President (Dr. G. W. Chaster) and Messrs. E. Collier, R. Standen, J. W. Jackson, J. W. Baldwin, F. Taylor, R. Cairns, C. H. Moore, and J. D. Dean; also specimens from the Society's Cabinets, and the Manchester Museum Collections.

352nd Meeting, May 9th, 1906.

Mr. Edward Collier (vice-president) in the chair.

Donations to the Library announced and thanks voted:

"Land and Freshwater Mollusks," *Harriman Alaska Expedition*, vol. 13, by Dr. W. H. Dall (*from the author*), and the usual periodicals received in exchange.

New Members Elected.

Francis Edward Adams, Carysfort, Shrewsbury.

Mrs. Emily J. Climensson, Shiplake Grange, Henley-on-Thames.

Miss Grace M. Grint, 33, Goring Road, Bowes Park, London, N.

Charles M. Hall, 33, Goring Road, Bowes Park, London, N.

Alexander Mackindoe, M.D., D.P.H., Sidmouth, Devon.

Marchese di Monterosato, 2, Via Grogorio Ugdaena, Palermo, Sicily.

Percy E. Radley, F.R.M.S., 30, Foxgrove Road, Beckenham, Kent.

John Ritchie, jr., Box 2795, Boston, Mass., U.S.A.

M. M. Schepman, Rhoon near Rotterdam, Holland.

Candidates Proposed for Membership.

Charles W. Johnson, Boston Society of Natural History, Boston, Mass., U.S.A.
 Albert E. Salisbury, 64, Pemberton Gardens, Highgate, London, N.
 Henry J. Stalley, Thornton House, Christ's Hospital, West Horsham, Sussex.
 Mrs. Alice L. Williams, 593, Jackson Boulevard, Chicago, Ill., U.S.A.

Papers Read.

"Note on *Odostomia lutea* Garrett," by J. Cosmo Melvill and R. Standen.

Exhibits.

By Mr. R. Cairns: A series of *Helix nemoralis* varr. *albolabiata* and *citrinozonata*, collected by him on the previous day in the Winnats Pass, Castleton, Derbyshire. He had found these varieties in unusual abundance, and all of the uniform bright yellow colour so characteristic of the species generally in this locality; dark-banded and other coloured forms being rarely seen.

By Mr. L. St. George Byne: A fine example of *Cypræa carneola* L., measuring 99×54 mm.

By Mr. J. Cosmo Melvill: *Helix pisana* from Tenby, and *Odostomia rufula* Souverbie from New Caledonia and Loyalty Islands.

By Mr. R. Standen: *Buccinum undatum* m. *sinistrorsum* from the Manchester Market.

By Mr. J. W. Baldwin: A white variety of *Gibbula magus* from Abersoch, Carnarvonshire.

By Mr. J. Wilfrid Jackson: *Pisidium henslowianum* and *P. subtruncatum* from the canal near Lancaster.

By Mr. B. R. Lucas: A fine series of non-marine shells collected recently during a short stay at Sligo, Ireland. The actual time spent in collecting was only six hours, made up of brief intervals snatched during car drives, but a total of 60 species, many in excellent condition, was obtained, including such forms as *Acicula lineata* and var. *alba*, *Vallonia excentrica*, *Acanthinula aculeata*, *A. lamellata*, *Valvata cristata*, etc., in abundance. The list is only 13 short of the number recorded for the Sligo district (*Irish Nat.*, Sept., 1904).

A fine series of nearly all the British Trochidae was shewn from the collections of Messrs. R. Welch, J. W. Baldwin, J. W. Jackson, J. Laycock, C. H. Moore, R. Standen, A. Leicester, R. D. Darbishire, and the Manchester Museum.

353rd Meeting, June 13th, 1906.

Mr. Edward Collier (vice-president) in the chair.

Donations to the Library announced and thanks voted:

"Storia del Dentalium politum di O. G. Costa," "Articoló sulle Auriculidae, Assiminiidae, e Truncatellidae dei mari d'Europa," and "Articolo sul Pecten opercularis e sue forme," by the Marchese di Monterosato; "Check List of the Mollusca of New York," by Elizabeth J. Letson; "Notes on Japanese, Indo-Pacific, and American Pyramidellidae," by W. H. Dall and P. Bartsch; "Descriptions of two new Naiads," by Paul Bartsch (*from the respective authors*); and the usual periodicals received in exchange.

New Members Elected.

Charles W. Johnson, Boston Society of Natural History, Boston, Mass., U.S.A.
 Albert E. Salisbury, 64, Pemberton Gardens, Highgate, London, N.
 Henry J. Stalley, Thornton House, Christ's Hospital, West Horsham, Sussex.
 Mrs. Alice L. Williams, 593, Jackson Boulevard, Chicago, Ill., U.S.A.

Candidates Proposed for Membership.

A. G. Marshall, Clovelly, Park Road, Wallington, Surrey.
 George Baxter Pritchard, F.G.S., 38, Mantell Street, Moonee Ponds, Victoria.
 Henry Suter, Haslett Street, Eden Terrace, Auckland, New Zealand.

Papers Read.

"Obituary Notice of the late William Nelson," by W. Denison Roebuck.

"*Vallonia costata + excentrica*," by Lionel E. Adams.

"*Bulinus fasciatus* Turt. [= *Helicella barbara* L.] in Lancashire," by J. Wilfrid Jackson.

"*Testacella haliotide* at Godalming," by O. H. Latter.

Exhibits.

By Mr. Lionel E. Adams: Specimens of *Vallonia* from Kettering, to illustrate his paper.

By Mr. J. Wilfrid Jackson: *Siliqua patuli* Dixon; *Motiliolus falcatus* Gld.; *M. stylina* Cpr.; *Platydodon cancellatum*; *Nucula proxima* Say; *Yoldia limatula* Say; *Anomia glabra* Ver., from Californian localities.

By Mr. J. Ray Hardy: *Helicella barbara* from near Bispham, Lancs.

By Mr. W. Whitehead: *Clausilia bidentata* var. *cravenensis* Taylor, and *Ancylus fluviatilis*, from River Doe, Ingleton, Yorks.

A particularly fine series of the genus *Catalus* was shewn by Messrs. J. Cosmo Melvill, Ed. Collier, B. R. Lucas, R. Cairns, R. Standen, and the Manchester Museum. Practically all the known species and varieties of this interesting genus were exhibited, but in the discussion which followed there was a general opinion that too many species had been made out of what may be merely local forms of the same thing.

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"Note on a new variety [*hyporhyssa*] of *Cerithidea sacra* Gld., from San Diego, Cal.," by S. S. BERRY. "Additional Notes on *Bifidaria pentodon* and *B. tappaniana*," by V. STERKI. "Description of new species of Achatinellidae from the Hawaiian Islands," by D. D. BALDWIN [*Partulina cooperi*, *P. fulvicans*, *Amastra sinistrorsa*, *A. lieva*]. "Notes on *Carychium* and description of a new variety" [*C. exile canadense* figd.], by GEO. H. CLAPP. "A new subspecies [*algonquinensis*] of *Polygra multilinea* Say," by WM. A. NASON. "*Lymnaea hinkleyi* n.sp." [from E. Idaho], by F. C. BAKER. "Note on some names in the Volutidae," by WM. H. DALL [*Adelomelon* n.n. for *Scaphella*, *Harpulina* for *Harpula*, *Maculopelphum* n.g. for *V. junonia*].

"Shell Collecting on the Mosquito Coast of Nicaragua, vi.," by W. H. FLUCK [5 new spp. mentioned, not described]. "A new Chinese *Sitala*" [*S. hangchowensis*] by H. A. PILSBRY. "New species of *Pisidium*" [*P. proximum*, Washington, B.C.], by V. STERKI. "The Manatee Snail, *Bulinulus dormani*" [economic value]. "Collecting in the Everglades," by A. G. REYNOLDS. "Output of American Pearls." "*Cochliopa rowelli* in California," by J. ROWELL. "On the generic name *Anostoma*," by H. A. PILSBRY. "On the Pathology of *Sphaerium*," by V. STERKI.

"*Epiphragmophora kelletti* (Fbs.) and *E. stearnsiana* (Gabb)," by GEO. H. CLAPP [specifically distinct, figd.]. "Mollusks of Oklahoma," by JAS. H. FERRIS [28 spp.]. "New species of *Pisidium*," by V. STERKI [*P. minusculum*, *P. fragillimum*, Wisconsin; *P. levissimum*, *P. subrotundum*, Michigan; *P. fiersoni*, Louisiana, &c.]. "A new *Sphaerium* [*S. stamineum forbesi*] from Illinois," by F. C. BAKER. "List of Wisconsin Shells, Freshwater Univalves," by C. H. CHADWICK. "Note on the Manatee Snail," by CHAS. T. SIMPSON.

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Nachrichtsblatt der Deutschen Malacozoologischen Gesellschaft, vol. 38, 1906, part 2, April-June.

"Emil Adolf Rossmäessler," by W. KOBELT. "Einfluss des bewegten Wassers auf die Gestaltung der Muschel aus der Familie Unionidæ Flem.," by HENRIK SELL. "Zwei neue *Macrodon*-Arten," by J. THIELE [*M. königswaldi*, *M. simplex*, Rio grande do Sul]. "Nachtrag zur Mollusken-Fauna Münchens," by W. BLUME [7 additional spp.]. "Beiträge zur Molluskenfauna des kroatischen Karstes," by TH. KORMOS [23 spp., *Xerophila vegliana*, n. sp., 2 nn. varr.]. "Ueber eine Reihe von Nachtschnecken, die Herr Dr. Cecconi auf Cypern und in Palaestina gesammelt hat," by H. SIMROTH [*Limax cecconii*, *Agriolimax cypricus*, *Amalia cyprica*, nn. spp.]. "Neue Formen und Fundorte der Genera *Pomatias* Studer [*P. mostarensis*] und *Auritus* Westerlund," by ANTON WAGNER. "Die Conchylienfauna eines pleistocänen Tufflagers im Tale der schwarzen Laaber bei Regensburg," by S. CLESSIN [93 spp.]. "Die Mollusken von St. Jodok a. Brenner," by W. BLUME [52 spp.]. "Zur Molluskenfauna von Montenegro," by OTTO WOHLBEREDT.

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Descriptions of New Species," by H. A. PILSBRY and Y. HIRASE [29 nn. spp., making total known 127 land shells, 26 aquatic]. "Hawaiian Species of *Endodonta* and *Opeas*," by H. A. PILSBRY and E. G. VANATTA [4 nn. spp. figd.]. "On some Pacific Cerithiidae" [*C. voyi*, *C. nesioticum* nn. spp.], by H. A. PILSBRY and E. G. VANATTA.

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Conchological Notes from Japan.—After just missing the Russian fleet our ship full of contraband of war arrived safely at Nagasaki two days after Togo had so satisfactorily arranged matters in the Korean Straits, and forthwith I entered upon a two-months' study of the natural history as well as of the other attractions of the Flowery Land. I am sorry to say that I found the collecting of land and freshwater shells disappointing in results. Though it was the rainy season, and during and after days of torrential rain I searched rocky roadside cuttings covered with moss and creepers, mossy stone walls, heaps of promising vegetable refuse among the fallen stones of ancient graveyards and in the shady groves of temples, and this in a sort of exaggerated Devonshire climate with subtropical heat between the showers, my success was not great. Round about the little peninsula that forms one side of Nagasaki harbour was any quantity of *H. sieboldiana* Pfr., but they were without exception immature and therefore useless; this was the only shell I came across in the district. My researches extended throughout June and July, a season in which in these latitudes one expects to find the adult snails pairing, feeding or aestivating; but as a matter of fact adult shells were scarce, young unformed last year's specimens being sometimes the only ones in evidence. The shortness of my stay, of course, prevented my ascertaining their times of hibernation, spring emergence,

&c. One species of slug (*Phylomicus biliniatus* Bens.) I found fairly commonly in Nagasaki, Kobe, Shimonoseki and Yokohama. Another larger and yellow-coloured I heard of but failed to secure. The only public collection of land and freshwater shells that I know of in Japan is a most complete and well-arranged one in the museum of the Tokio University, through which Professor Ijima was good enough to guide me. One day in a country graveyard near Yokohama I found a promising heap of leaves and stones, and as I was busily engaged upon this I was accosted by an old gentleman dressed in a large pair of spectacles and a very scanty pocket-handkerchief and holding a gorgeous paper umbrella over his shaven head. As my knowledge of Japanese is not extensive I could only conjecture that he wished to enquire what I was doing amid the ashes of his ancestors. Being accustomed to similar enquiries under similar circumstances I had ready a reply that I have always found receive respectful credence in many countries, viz.—that I was a doctor and was collecting snails as medicine. Evidently much impressed he helped me in my search in odd corners of the graveyard and we finally parted with oriental compliments and salutations. The result of our combined labours was the following *Clausilia* which Mr. E. R. Sykes has been kind enough to identify for me. *Cl. japonica* Crosse; *Cl. aculus* Bens., and *Cl. hyperolia* Mart.; also *Eulota goodwinii* E. A. Smith. Not far from the famous waterfall at Kobe I came across a colony of *Eulota aperata*, all of which are of a smaller and rather thicker appearance than the type in the National Museum at South Kensington. Here I would pay a tribute to the courtesy of the country people who would frequently help me when they came upon me collecting; men, women and children would bring me frogs, newts, beetles, crabs, &c., and whenever I rewarded a small boy with a coin, it was always evidently quite unexpected. Indeed the only act of discourtesy I experienced was from a sampan man who, on receiving not more than double his proper fare for pulling me on board my ship, vented his wrath upon me in words which showed his acquaintance with English or American firemen. Ponds and ditches were usually destitute of molluscan life, partly perhaps on account of the enormous quantity of frogs and sometimes crabs, which might feed on the spawn and the young snails, but probably more because the hill streams which feed the ponds and ditches are dry during the greater part of the year. In the neighbourhood of Kobe I came upon a wide ditch-cutting about seven feet deep with a clear sandy bottom and steep sides. The ditch was dry when I commenced to walk along the bottom but numbers of *Melania libertina* Gould were crawling about on the sand. Presently a tremendous downpour commenced on the neighbouring hills and in ten minutes a torrent of water two feet deep was rushing down to the sea. In some of the more stagnant ditches between paddy fields I found a few *Paludina japonica* Mart., a few small Anodons and dead valves of ordinary looking *Sphaeria*. At Yokohama I came upon *Ganesella japonica* Pfr., and at Kobe several *Eulota similis* Fér., which species Mr. E. A. Smith informs me is widely distributed in the Far East in rice districts. Leaving Japan we proceeded to Java, but here my researches resulted in absolutely nothing as far as non-marine mollusks were concerned, my wanderings being confined to the plains on the coast where no rain had fallen for two months, and dust was thick everywhere. The rivers and ditches are muddy creeks without weeds of any kind, and the stagnant marshes at Sourabaya were apparently destitute of every sort of animal life. I was informed, however, that in the forests among the mountains land shells were in great profusion.—

LIONEL E. ADAMS (*Read before the Society, April 11th, 1906*).

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OCTOBER, 1906.

No. 12.

OBITUARY NOTICE OF THE LATE WILLIAM NELSON.

Born 1835 November 9—Died 1906 January 28.

(Read before the Society, June 13th, 1906).

PLATE VII.

By the death of William Nelson, of Leeds, which happened at his residence at Crossgates, on the 28th of January, the Conchological Society loses one of its founders, and co-editor with Mr. John W. Taylor of the first volumes of this *Journal*. He has so seldom been seen at its meetings of late that possibly but few of the members can realize the value of his work, his example, his influence, to the Society during its period of early development, but that it was adequately appreciated may be seen in the fact that he was the only British resident to receive the honour of being selected one of the ten Honorary Life Members, a position in which he succeeded so eminent a malacologist as J. R. Bourguignat.

Mr. Nelson was a worthy representative of the working-man class of naturalist, and he was a genuine naturalist from a very early age. Born on the eastern side of Leeds in November, 1835, he was but a child of four, when after a long illness, he was sent to Askern, where he lived with an old man, Mellor by name, who had a collection of butterflies, and in whose company the little boy, seeing Painted Ladies and Marbled Whites, was first fired with the love of nature. This was re-awakened when in 1859, beginning to work at his trade of currier at Wakefield, he came into contact with the naturalists of that town and their collections. The specific impetus that made him a conchologist came from listening to a lecture on the subject of shells given at Leeds by the celebrated marine zoologist, the Rev. Thomas Hincks, B.A. His activity and energy soon manifested itself and about 1862 he gathered kindred spirits unto himself and founded an East End Naturalists' Society in Leeds, and in Birmingham—in which

city he spent several years from 1864—he took the first prize for a display of shells at an Industrial Exhibition in 1865, and formed a small conchological society, of which he acted as secretary. He was an active member of the Birmingham Natural History and Microscopical Society, of which he was afterwards made a life member, and to which he contributed a valuable paper on “The Limnæidæ of Birmingham,” thus early showing his bent for the study of that group, of which he made a specialized collection, probably one of the best ever put together. He returned to Leeds about 1871, and continued to live there the remainder of his life, taking active part in the various societies, the Leeds Naturalists’ Club, the Co-operative Field Club, the Conchological Club (now the Conchological Society of Great Britain and Ireland) and the Yorkshire Naturalists’ Union.

It was but a short while after his return to Leeds that he and three others founded the Conchological Club—and he was its first president, afterwards taking his turn of all the other offices—and it was about the same time that he assisted Mr. Taylor when he commenced the *Journal of Conchology*.

As a man and a naturalist he was loved and appreciated by all who knew him; and his well-knit sturdy form, his fine round open countenance, with close-trimmed hair and beard, were always a welcome sight to his many friends, while his conversation—enlivened by an inimitable and subtle dry humour, devoid of all malice—was always enjoyed at a naturalists’ gathering.

Scientifically he was not a prodigal writer—his excessive caution and distrust of his own judgment prevented him from publishing much—and there are but few papers of his in print. Most of them deal in a pleasant chatty way with his excursions in search of natural history objects, one of them, dealing with his visit to Loch Skene on a conchological visit to see and collect *Limnæa burnetti*, being particularly interesting; unfortunately, however, it only appeared in a Leeds newspaper’s weekly edition. Some of his notes appeared in “The Naturalist,” others in this journal in its earlier volumes. But if he was not a prolific writer himself, he had the sublime gift of inspiring enthusiasm in others, and there are naturalists more than one who owe to him the inspiration which brought them into the field. He was a happy combination of the all-round naturalist, who knows most of the objects he sees and takes a delight in all the phenomena of nature, with the specialist whose particular line of research was pursued with persevering ardour. So besides knowing much field-botany, entomology and ornithology, he was before everything a student of land and freshwater mollusca—and of the Limnæidæ in particular. He was also a student of general literature and particularly partial to the homely verse of Burns.

He was twice married—and he leaves children of two families, besides grandchildren. For some years he had been failing in health and strength, being subject to heart-weakness, and liable to hemiplegic attacks. It was one of these that prostrated him on the evening of Sunday, the 21st of January, after he had spent his Saturday afternoon in collecting a remarkable form of *Limnæa stagnalis* at Belle Isle, Middleton, near Leeds, and his Sunday in arranging some of his shells and a week later, 28th, he passed away.

His fine collection of shells and his library of conchological works he bequeathed by his will to his friends Mr. Taylor and Mr. Roebuck, to be by them disposed of for the benefit of the four young children of his second marriage, and it is much to be desired that in some manner they may be acquired for the benefit of his native town.

R.

Further Notes on French Shell Names.—The Rev. Canon Horsley has already (*J. Conch.*, vol. 9, p. 15) made some remarks on the tendency on the part of certain continental conchologists to split up and name, as species, mere varieties of common shells. He also gives a list of some shells he received in exchange, many of which are referable to *H. virgata*. Having recently had a similar experience, I can fully sympathise with him and also add a number of other "species" to his list, these being:—*H. melantozona* Caziot, *H. mucinica* Bgt., *H. peregrina* Loc., *H. azami* Loc., *H. grannonensis* Bgt., *H. angustiana* Loc., *H. evenosi* Loc., *H. unifasciata* Poir, *H. mendranoi* Serv., *H. palonica* Serv., *H. acomptiella* Loc., *H. limbifera* Loc., *H. gindeloni* Loc., *H. lineata* Oliv., *H. subneglecta* Bgt., *H. pyramidata* Drap., *H. misarella* Loc., nearly all of which I can find among the varieties of *H. virgata*. In the same way *H. pictonam* Bgt., and *H. olisippensis* Serv., are merely varieties of *H. caperata*. On calculation it will be seen that *H. virgata* rejoices in no less than 35 names. This wholesale species-making is strongly to be deprecated. One cannot contemplate with equanimity the possibility of these named forms being recognised and added to some future British list as "species" by persons smitten with a desire for notoriety!—J. WILFRID JACKSON (*Read before the Society*, April 11th, 1906).

Vertigo alpestris in Westmorland.—In reference to a note in the Proceedings of the meeting on Sept. 15th, 1905 (*antea* p. 266), pointing out the Kirkby Lonsdale record as being the first for the above species in Westmorland, it will be of interest to know that it has been previously recorded for that county from three different localities:—Forbes & Hanley, "*Brit. Moll.*," vol. 4, 1853, p. 107, mention it as a variety of "*pygmæa*" and say "Mr. Gough observes that at Kendal it is chiefly found on slate." Further, in Jeffreys' "*Brit. Conch.*" vol. 1, 1862, p. 260, will be found:—"Grassmere (J.G.J.); near Ambleside, on slate (Miss Sarah Bolton)." Out of respect for the older collectors, as well as the fact that the supposed first record for the county has been copied in other journals, it is desirable that these prior records should not be lost sight of.—J. WILFRID JACKSON (*Read before the Society*, April 11th, 1906).

THE PREVENTION OF CORROSION IN SHELLS.

By L. ST. G. BYNE, M.Sc.

(Read before the Society, February, 14th, 1906).

SINCE the publication of my two former papers upon the important matter of the Corrosion of Shells in Cabinets, I have had a few instances of this mischief brought to my notice. In all these the symptoms have been the same, and very characteristic, namely, the white powdery efflorescence and the vinegar-like aromatic odour. This latter is a most fortunate thing, for it enables specimens which have become affected to be at once dealt with. The only affected shell in my own collection so far has been a *Cypræa argus*, which I at once burnt. One correspondent cracked up his spoilt shells and gave them to his fowls to peck at.

There is a spurious form of trouble which is that of bleaching by the sun on tropical shores. I had an example of *C. argus* from North Borneo bleached snow-white all over the dorsal surface.

Nothing has since transpired to make me alter my opinion that the mischief is the result of the action of Bacilli. I have been led to this by extensive chemical experiments, which show that the white efflorescence is mainly composed of calcium butyrate, produced by the action of butyric acid on the calcium carbonate of the shell structure. This butyric acid must be the result of the presence of the bacillus of butyric fermentation. I fail to see what other explanation there can be. Pieces of animal left in the shells may be responsible. I have dealt with this fully in my second paper.

I willingly admit that I have never isolated any definite bacillus, as I have neither the knowledge nor means of doing so. It should be possible for a bacteriologist to obtain a culture by placing sterilized glycerine in a glass bell jar containing corroded shells.

I have not seriously considered the action of *damp*, because it has not come into any case that I have looked into. In the National Collections, South Kensington, where corrosion is rife, the rooms, etc., are very dry. Nor does the suggestion of Mrs. Kenyon that "saline particles" are responsible recommend itself to me.

The method of prevention I now recommend is of the simplest nature. The shells must first be thoroughly soaked in water, rubbed with soap, and then perfectly dried. They are then to be rubbed over with a small quantity of linseed oil, any excess being removed with a rag. I am quite sure that this treatment will act efficaciously. I formerly recommended soaking the shells in a solution of corrosive

sublimate (mercuric chloride), but this is cumbersome. I find it a good plan to take the drawers out of my cabinet about once a month and leave them in the air for a day. This does away with chance of mustiness and damp. I have a great objection to the smell of oil of cloves, and should never use it. I shall be pleased to receive criticisms or suggestions.



Acanthinula lamellata (Jeff.) at Grange-over-Sands, Lancs., and Notes on various other Species.—In the middle of October last I paid a visit to Grange-over-Sands, and in company with Mr. J. D. Dean further explored that conchologist's paradise, Eggerslack Wood, in the hope of increasing my set of *Acicula lineata*, of which I took three specimens in 1903. The weather was anything but congenial, heavy showers being the order of the day, and as the few previous days had been very cold, a big "bag" was hardly to be expected. Under these unfavourable conditions I set to work to search the moss and dead leaves, when to my surprise, instead of *Acicula* I found a living full-grown *Acanthinula lamellata* under a dead branch of elm, the nearest holly being ten yards away. This, I find, is a new record for District 69. As I have always associated holly leaves with this species, having taken it amongst them in Ireland, I commenced to hunt amongst the dead leaves strewn about, but failed to discover any more specimens. I also tried other hollies further up the wood, but with no better success. Here, however, *Euconulus fulvus* and *Acanthinula aculeata* were common on dead holly leaves. Slugs were common in many parts of the wood, *Agriolimax agrestis*, *Arion ater*, *A. hortensis*, *A. minimus*, *Limax maximus*, and *L. arborum* being the chief species. At one place I noticed a fine specimen of *Arion ater* var. *alba* on the same stone as a typical specimen. Shells on the whole were scarce, the absence of otherwise common species being noticeable. Even *Vertigo alpestris*—an abundant shell here—only occurred in small numbers on the walls surrounding the wood. *V. pusilla* occurred sparingly. *Clausilia bidentata* and *Cl. laminata* were fairly common on dead logs and climbing up trees. *Jamania cylindracea* was, as usual, very prolific. So also was *Pyramidula rupestris*.

Leaving the wood I went in search of *Helicella caperata*, which, with its var. *ornata*, I found common on the cliffs on Lindale Road, and swarming over the wet rocks and herbage at the foot of the same. Amongst the herbage there was a quantity of tansy, and I have observed a partiality for this plant on the part of *H. caperata* in other localities. Most of the shells here were full grown and of a large size, and with them were many immature *Hygromia rufescens* and *Vitrea cellaria*. The latter species, however, was not so active as *H. caperata*. It was on these cliffs that I found a couple of specimens of *Vitrea lucida* in 1903, and as no further specimens rewarded my search, and not having heard of any having been taken there since, I have come to the conclusion that my specimens must have arrived there with greenhouse refuse, most probably thrown down from gardens above. As *H. caperata* proved so plentiful here, I was led to try the colony of *Pomatias elegans* about a mile and a half along the Meathop Road, but notwithstanding my most strenuous efforts, I failed to find a single specimen either young or old. It seems a remarkable thing that this apparently well-protected shell should disappear in this way early in the autumn, and as I had the same experience at Silverdale last autumn, I should like to know whether this is general throughout the country. At both the above places the shells are quite common during the spring and summer.—J. WILFRID JACKSON (*Read before the Society, November 8th, 1905*).

NOTE ON ODOSTOMIA LUTEA Garrett.

By J. COSMO MELVILL AND ROBERT STANDEN.

(Read before the Society, May 9th, 1906).

ODOSTOMIA LUTEA Garrett, a smooth, oblong, fusiform species from New Caledonia and Lifu, is most variable in coloration, so much so indeed, that there can be but little doubt that it has been thrice described, under different specific names. We think it worth while to give, in each instance, the original descriptions more or less in full, as follows:—

1. Odostomia lutea Garrett.¹—"Shell elongate, subulate, smooth, shining, luteous-yellow; spire long, the upper half tapering more rapidly than the lower; apex acute; whorls 9-10, flatly convex, last one subangulate near the base, obsoletely striated by lines of growth; suture impressed and margined beneath; aperture widely ovate, about one-fourth the length of the shell; peristome thin, nearly straight, obsoletely angulated at the base; columella slightly callous, somewhat reflexed so as to form a slight umbilical fissure, and distinctly plaited. Length 7 mm.

Hab.: Viti Isles. (Coll. Garrett.)

Three examples found on a sandy mud-flat."

2. Odostomia rufula Souverbie².—"Testa fusiformi, sat solida, nitida, lævi, longitudinaliter tenuissime striata, striis prope labrum magis conspicuis, basi vix conspicue spiraliter striata, rufulo-fulva, basi flavidulo-alba; anfr. 9? (apice fracto et anfr. 7 modo numerante), sutura impressa discretis, subconvexis, ultimo $\frac{1}{4}$ longitudinis vix æquante. Apert. piriformi, superne angulata, marginibus callo tenui junctis, labro sub-acuto, columella subobliqua, superne plicam subascendentem gerente. Long. (apice fracto excluso) 7, lat. max. $2\frac{1}{4}$ mill.; apert. 2 mill. longa, $1\frac{1}{4}$ lata. (Mus. Burdigalense). Spec. 2 vidi.

Var.: β alba, fulvo unizonata.

Hab.: Ins. Lifou (Loyalty), Archip. Caledon. (R. P. Lambert).

Coquille fusiforme, assez solide, lisse, luisante, très finement striée longitudinalement, les stries près du labre étant plus apparantes, à peine visiblement striée spiralement à la base, fauve roussâtre, d'un blanc un peu blond à la base; tours 9? (sommet fracturé et dans cet état en ayant 7) séparés par une suture imprimée, subconvexes; le dernier égalant à peine le $\frac{1}{4}$ de la longueur totale. Ouverture piriforme, anguleuse dans le haut, à bords réunis par une mince callosité,

¹ "Descriptions of new species of marine shells inhabiting the South Sea Islands," *Proc. Acad. Nat. Sci. Philadelphia*, p. 236, pl. 3, fig. 50, 1873.

² "Descriptions d'espèces nouvelles de l'Archipel Calédonien," *Journ. de Conchyl.*, vol. 23, p. 290-291, pl. 13, fig. 7, 1875.

labre subtranchant; columelle suboblique, portant dans le haut un pli subascendant. (Musée de Bordeaux.) Vu 2 exemplaires.

Var.: β . De coloration blanche, avec une zone transverse fauve.

Hab.: Ile Lifou (Loyalty) (R. P. Lambert)."

3. *Syrnola mossiana* Melvill & Standen.¹—"S. testa attenuata, lævi, nitida, delicatula, anfractibus septem, suprâ subventricosis, apud suturas pallide ochraceo cinctis, ultimo anfractu recto, prolongato, in medio ochraceo cincto, apice obtuso, apertura oblonga, labro exteriori simplice, columella uniplicata. Long. 7-50 mill. Lat. 2-25 mill.

Hab.: Lifu.

A few specimens only. The shell is smooth, whitish, shining, pyramidal, whorls seven, the upper ones somewhat ventricose, the last whorl straight and produced, with a pale ochraceous median band, this band being also perceptible around the sutures of the upper whorls. The apex is obtuse, outer lip simple, columella with one fold or plait. We have much pleasure in associating with this shell the name of Mr. William Moss, of Ashton-under-Lyne."

Dr. Andrew Garrett described his *O. lutea* from the unicolorous yellow-brown or raw sienna form, which with several gradations runs into the *rufula* of Sowerbie. This is, perhaps, the commonest variety. Smooth, with white ground, once spirally fasciated with pale yellow or chestnut banding.

Of *Syrnola mossiana*, the type, now in the Manchester Museum, exhibits an albino state, entirely unicolorous white, but, in the original description, the banded variety is mentioned. A comparison of all these forms in our own, the British Museum, and the Manchester Museum collections convinces us that it is necessary to amalgamate the three so-called species under the prior name of *O. lutea* Garrett.

It is by no means always easy to separate shells of the larger and more attenuately fusiform *Odostomia* from other allied genera, e.g., *Styloptygma* and *Syrnola*. As regards this present species it seems to embody in it certain characteristics of both these last-named genera. Both it and *O. versicolor* M. & St., from Lifu, which, indeed, possesses close affinities with *O. aciculina* Souv., if indeed, it be not a form of it, are, to our mind, satisfactorily separable from *Odostomia* but placed in one or other of the kindred Adamsian genera. The late Dr. Arthur Adams' differentiations of certain genera in this family are unfortunately frequently vague and unconvincing, and it is to be wished that a monographer could be found to undertake the herculean task of sorting out the 'Augean stable' where at present repose the multitudinous members of the ancient, but complex, family of Pyramidellidæ.

¹ "Notes on a Collection of Shells from Lifu and Uvea, Loyalty Islands, &c.," *Journ. Conch.*, vol. 8, p. 122, pl. 2, fig. 16, 1895.

VALLONIA COSTATA + EXCENTRICA.

By LIONEL E. ADAMS, B.A.

(Read before the Society, June 13, 1906).

IT will be seen at a glance that the specimens, which are herewith submitted for inspection, bear the same relation to *V. costata* that *V. excentrica* bears to *V. pulchella*; that is to say that they are of the ribbed *costata* form with a very pronounced eccentricity. I picked them out of a number collected round Kettering; unfortunately, as they were long since dead, it was too late to submit them to an expert in radulae for examination. The eccentricity of these specimens, as also of *V. excentrica*, seems to arise in the following manner:—Towards the end of the second year's growth the shells of some individuals expand slightly more than usual, though not assuming the expanding trumpet-mouth of the adult of three years' growth; then the animals hibernate, and the next spring, on emerging from winter quarters, drained of much of their vigour, are obliged to continue the shell-growth on a more economical scale, and the continuation of the outline of the shell is accordingly contracted in the process.

We find this same eccentricity occasionally in *Planorbis corneus* Linné, and always in the case of *Corilla erronea* Alb., and *C. odontophora* Benson. A similar contraction of the last whorl is common in *Limnæa peregra* Müll., and *L. stagnalis* Linné, but in these cases the eccentricity of outline is not noticed as in discoid shells, which are viewed and figured from a different point of view. I think, too, that the peculiar distortion of *Gibbulina lyonetiana* Pallas is due to the same cause, and doubtless many similar examples will be familiar to most conchologists.

Now, in the case of the foreign examples mentioned, the irregularity of outline is, as far as I am aware, universally characteristic; but if it were not, and symmetrical individuals were found to exist, would these be recognised as worthy of separate specific rank? So far, the occasional eccentric *Planorbis corneus* have found no advocate for even varietal differentiation. It would, of course, be very unscientific to cavil at the value of specific differences, merely because of the minute size of such objects as the *Valloniae*, but it would be reassuring to have some particulars of the intermediate forms, if such there be. Tryon ("Manual" (2) vol. 8.), describes eight species in the "*pulchella* group," and in the "*costata* group" five species with four varieties of *costata*. The radula of *V. pulchella* is described as having 65–68 transverse rows of 27 teeth, and that of

V. excentrica 81-84 transverse rows of 29 teeth. Presumably, we may take it for granted that a sufficiently long series of radulae have been found to be constant, and that there are no intermediate forms. It may be as well to defer giving a special name to *V. costata* of the eccentric form until the radula has been examined, and it would also be interesting to note whether symmetrical and eccentric individuals interbreed.



On the Danger of using Mercuric Chloride in the Sterilization of Highly-Polished Shells.—Sometime back, after reading Mr. Byne's paper in this *Journal* (vol. 9, p. 172, 1899), I thought it advisable to sterilize my shells, and started, unfortunately, on some of my best, viz., *Cypraea pallida* (Gray); these shells of the dark type had a brilliant polish and free from any markings or spots other than the natural ones on the shells. I soaked them for two days in warm water at about 37°C., then put them in a solution of mercuric chloride, 1 gramme in 500cc. of water. They remained in this for twenty-four hours at 37°C., were then taken out and allowed to dry without polishing. I made sure that the HgCl₂ solution was not acid, yet when I started to polish up the shells with a clean duster I found that the lustre was considerably impaired, and that the shells were marked nearly all over with bright yellow metallic looking spots that seem to have got underneath the enamel of the shell, and through microscopic cracks in the enamel; there being no chance of reducing mercuric chloride to metallic mercury, in the present case the only thing I can suggest is the formation of a thin film of mercuric sulphide through decomposition of traces of organic substance in the shell itself, containing a sulphur compound.—B. R. LUCAS (*Read before the Society*, January 10th, 1906).

Testacella haliotideae at Godalming.—Last evening I captured five specimens of *Testacella haliotideae* upon a stone wall bounding the garden of one of my colleagues here. The slugs were apparently crawling down the wall from the ivy which climbs thickly over the top. They were about five feet above the ground. I imagine that the recent heavy rains had driven them out of the ground, and that they had taken refuge in the ivy, and on the return of hot dry weather were making for their usual subterranean quarters. I have never heard of this slug being taken here before, though I have lived here for over fifteen years and have always kept a look out for it for the sake of our museum collections.—OSWALD H. LATTER (*Read before the Society*, June 13th, 1906).

Numerous Species in a Restricted Area.—In a small wood at Georgenthal, Thuringia, about fifty yards square, I found in May, 1904, the following species:—*Helix pomatia*, *H. nemoralis* and varr. *poiretia* and *gmelinia*, *H. hortensis* and varr. *quinque-vittata*, *lutea*, *baudonia*, *bouchardia*, *H. strigella*, *H. fruticum*, *H. incarnata*, *H. lapicida*, *H. itala*, *H. obvoluta*, *H. personata*, *H. hispida* and varr. *concinna* and *albida*, *H. arbustorum* var. *canigonensis*, *H. rotundata* and var. *alba*, *Buliminus montanus*, *B. obscurus*, *Clausilia biplicata*, *Cl. laminata*, *Cl. plicatula*, *Azeca tridens*, *Cochlicopa lubrica*, *Vittrina pellucida*, *Hyalina helvetica*, *Hy. nitidula*, *Hy. crystallina*, *Hy. cellaria*.—F. H. SIKES (*Read before the Society*, March 14th, 1906).

THE GENUS *DORIOPSILLA* Bergh.

By SIR CHARLES ELIOT, K.C.M.G.

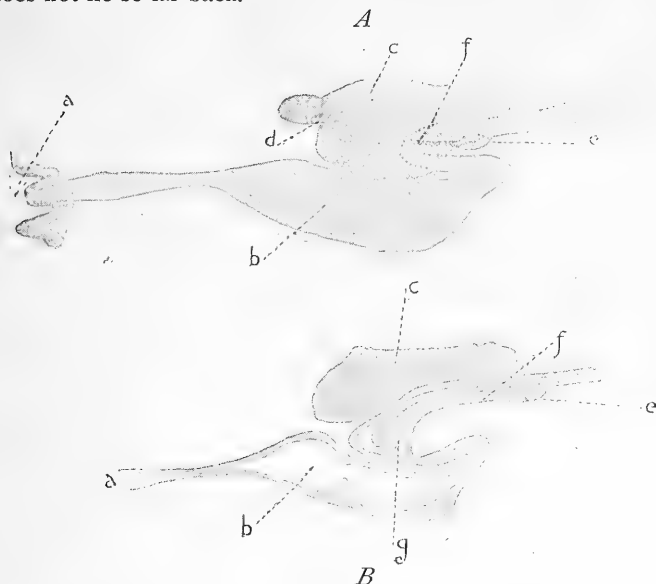
(Read before the Society, September 12th, 1906).

IN this *Journal* (*antea* pp. 254-5) I described specimens of *Doridopsis miniata* Alder & Hancock under that name and stated that they had the central nervous system arranged as in *Doridopsis*. A further examination, however, made with sections has shown me that this statement is incorrect and that the nervous system is as in *Doriopsilla*. The species must accordingly be called *Doriopsilla miniata* (A. & H.). The difference between the two genera is that in *Doriopsilla* the buccal ganglia lie immediately behind the rest of the nervous system, whereas in *Doridopsis* they are situated some way back on a constriction of the œsophagus and are united to the central nervous system by rather long connectives. Not only is it often difficult to determine the position of the buccal ganglia in preserved specimens by ordinary dissection but the digestive tract of *Doriopsilla* is supported by threads which can easily be mistaken for the long buccal connectives of *Doridopsis*.

Though the position of the buccal ganglia may seem a somewhat minute character, it is of considerable structural importance, for it would appear that these ganglia must be regarded as marking the commencement of the œsophagus, whereas the part of the alimentary tract lying in front of them corresponds to the buccal mass of Dorids, which possess a radula. The difference between the arrangements found in *Doridopsis* and *Doriopsilla* is further explained and illustrated in a paper by me on the Nudibranchs of Southern India and Ceylon which will shortly appear in the *Proceedings of the Zoological Society*.

I have also examined by sections the animal described by me as *Doridopsis reticulata* Cockerell & Eliot (*Journ. Malacol.*, vol. 12, p. 41, 1905) and think that it is likewise referable to *Doriopsilla*. The real buccal ganglia are not, as stated, 4 mm. behind the central nervous system but immediately behind it and are united by short connectives to the part that seems to correspond to the pleural ganglia. The arrangement of the alimentary tube differs in some particulars from that found in *D. miniata*. The part in front of the nerve collar is broad and pouch-like. Just under the nerve collar is a valvular apparatus, separating this anterior dilated portion from the narrow posterior portion, which is long and bent. Before entering the liver the alimentary tube dilates again into a pouch, divided by the constriction. Under the buccal parts was found a large bilobed gland, but its connection with the alimentary tube, though probable, could

not be demonstrated. It is possible that in life the valvular apparatus does not lie so far back.



The figures will, perhaps, make the matter plainer. *A* represents the anterior part of the alimentary tube with the central nervous system and *B* the same organ in section. The meaning of the letters is as follows: *a* mouth; *b* dilated anterior portion of the alimentary tube; *c* central nervous system; *d* eye; *e* buccal ganglia; *f* buccal connectives; *g* valvular apparatus.

***Bulinus fasciatus* Turton [= *Helicella barbara* (L.)] in Lancashire.**—I have recently become possessed of several letters written by the late Mr. Thos. Glover, and in one of them, written in 1887, which contained a list of species collected by him, I was interested to find a reference to the occurrence in Lancashire of *Bulinus fasciatus*. He quotes as the locality—"On the beach between Rossall and Fleetwood." Several of our members have, since Glover's time, carefully searched this part of the coast without success. Mr. J. Ray Hardy, however, informs me that in 1892, whilst staying at Bispham along with his nephew Mr. George Hardy, he discovered a large colony of this species in company with *H. caperata* and *H. virgata*, on the grassy banks of an old bye-lane, known locally as the "Roman Road," leading from the village of Bispham to the sea-shore. It occurred in abundance from the shore to about a hundred yards up the lane. This isolation of the colony probably accounts for the species being overlooked by other observers, and as its occurrence has not hitherto been noted I am pleased to have the opportunity of placing on record what must be to Lancashire conchologists an interesting observation, inasmuch as it constitutes the sole record of this species for the county.—J. WILFRID JACKSON (*Read before the Society*, June 13th, 1906).

NOTES ON THE BRITISH LAND AND FRESHWATER SHELLS

Collected by the late Mr. THOMAS GLOVER.

BY HIS DAUGHTER, MARIA GLOVER.

(Read before the Society, April 11th, 1906).

MR. J. WILFRID JACKSON, of Manchester, whilst on a visit to Southport recently, called to see my father's collection of shells, and incidentally mentioned that a few notes on the British land and freshwater species contained therein would be much appreciated by the members of the Conchological Society, especially as my father never published any of his observations. Acting on his suggestion I have made out the following alphabetically arranged list, with the habitats and the approximate dates when the shells were collected, and hope the same may not be uninteresting.

I think my father began to take an interest in conchology about the year 1821, when he went to reside at Sharston, near Manchester, and became acquainted with several conchologists there, and he retained a keen interest in the study as long as he lived.

In my list I have kept to the old names used by my father and have placed, where necessary, the modern names in brackets immediately following them. My father's actual notes are copied verbatim and are initialled T.G. For many years prior to his death I entered keenly into his conchological pursuits and accompanied him on many of his excursions. Where dates are missing the year when the species were collected is uncertain.

Ancylus fluviatilis *Müll.*—Very fine in Bassenthwaite Lake; also in the Leeds and Liverpool Canal, 1835.

A. [Acroloxus] lacustris *Linné.*—"Found frequently on the stems of Typha and other aquatic plants about Blackpool and Freckleton, Lancs., 1824.—T.G."

Azeca tridens (*Pult.*).—On stones near the Ribble at Gisburn Park, Yorks., not common, 1830.

Achatina [Cæcilioides] acicula (*Müller.*).—Walls of Hastings Castle, 1842.

Balea perversa (*Linné.*).—On apple and willow trees at Freckleton, Lancs., 1828.

Bulimus obscurus (*Müll.*) [= **Ena obscura**].—Near Lancaster, 1831.

B. fasciatus *Turton* [= **Helicella barbara** (*L.*)].—Llandudno and Tenby, 1838. On the beach between Rossall and Fleetwood, Lancs.

B. bifasciatus (*Pult.*) [= **Helicella barbara** (*L.*) v. **bizona**].—Tenby, 1838.

Carychium minimum *Müller.*—Chester.

Clausilia rugosa *Drap.* [= **Cl. bidentata** (*Ström.*)].—Gisburn Park, Yorks., 1830; plentiful on limestone rocks, near Matlock, 1877.

Cl. laminata (*Mont.*).—Gisburn Park, Yorks., 1830.

Cyclostoma [**Pomatias**] **elegans** (*Müller.*).—Banks of the Wye at Clifton; and at Torquay, 1838.

Helicella fulva (*Müll.*) [= **Euconulus fulvus** (*Müll.*)].—Near the aqueduct at Lancaster, 1829.

Helix [**Helicigona**] **arbustorum** (*Linné*).—Preston, Lancashire; Matlock, Derbyshire.

var. **flavescens**.—Ashford, Kent, 1852; Matlock, 1877.

var. **cincta**.—Matlock Bridge, near the Iron Chalybeate Well, 1879.

Helix aspersa *Müller.*—Common on nettles on the Cambridge Road, Southport, 1880.

var. **unicolor**.—Dawlish, Devonshire, 1840.

var. **exalbida**.—Dawlish, Devonshire, 1840.

monst. **sinistrorsum**.—Cheltenham, Glos., one specimen, 1877.

H. [Helicella] caperata (*Mont.*).—

var. **gigaxii**.—Southport.

var. **major**.—Birkdale, 1877.

var. **ornata**.—Plentiful at Southport, 1873.

H. [Hygromia] fusca (*Mont.*).—Preston, Lancs., and Gisburn Park, Yorks., 1830; Hough-end-Clough, near Manchester, 1826.

Helix ericetorum (*Müll.*) [= **Helicella itala** (*L.*)].—

var. **alba**.—Scarborough, 1840.

var. **instabilis**.—Doohulla, West of Ireland, 1860.

var. **leucozona**.—Dublin and Tenby, 1850.

H. hortensis *Müller.*—"Very common. It occurs plain, white, yellow, reddish, brown, rarely with one or two stripes, not unfrequently with four, but more commonly with five stripes. The stripes are often confluent. I have found some very dark confluent specimens at Matlock Bridge, not far from Smedley's, 1879.—T.G."

var. **fuscolabiata**.—Pinner, Middlesex, 1842.

var. **incarnata**.—Matlock and Miller's Dale, Derbyshire; Ashford, Kent.

var. **lutea**.—Preston, Lancs., 1837; Matlock Bank, Derbyshire.

var. **olivacea**.—York, 1847.

var. **roseolabiata**.—Pinner, Middlesex, 1842.

var. **pallida**.—Matlock.

H. [Helicigona] lapicida (*Linné*).—Plentiful at Matlock Bridge, along with a few specimens of var. **albina**, 1878.

H. [Vallonia] pulchella (*Müll.*).—Arnside, Westmorland.

H. [Pyramidula] rupestris (*Drap.*).—Arnside; and Furness district, Lancs.

H. nemoralis *Linné*.—"A very variable shell occurring almost everywhere, though the varieties are somewhat local. They vary in color, being white, yellow, red, or brown. They are commonly either plain or with one, three or five stripes, rarely two or four stripes. Occasionally they are found with the margin of the aperture white, in which case the bands are usually transparent lines.—T.G."

var. **albolabiata**.—Oban, 1850.

var. **carnea**.—Miller's Dale, 1873.

var. **castanea**.—Between Naze and Freckleton, Lancs., 1824.

var. **hyalozonata**.—Llandudno, on the road to Conway, for half a mile on each side of the road, 1853.

H. pomatia *Linné*.—In the year 1877, my father, who was then above 80 years of age, spent a whole day with a friend hunting for these shells among the Cotswold Hills, near Leckhampton. They found a considerable number.

H. pygmæa *Drap.* [= **Punctum pygmæum**].—Among dead leaves and stones in gravelly soil, Lancaster, 1833. Mr. James Glover, of Lancaster, used to collect the leaves and put them in water. The sediment frequently contained a number of shells.

H. [Hygromia] rufescens (*Penn.*).—

var. **alba**.—Windsor and Richmond, Surrey, 1840.

H. [Helicella] virgata (*Da Costa*).—

var. **alba**.—Clontarf, near Dublin; also in Connemara between Clifden and Roundstone, W. of Ireland, 1859.

var. **leucozona**.—Exeter and Exmouth, 1838.

var. **submaritima**.—Blowick, near Southport, 1872.

H. pisana *Müller*.—Tenby, 1838.

Limnæa auricularia (*Linné*).—Aigburth, near Liverpool, in ditches, nearly dried up in summer, not common, 1836.

Neritina fluviatilis (*Linné*).—Plentiful on the weir across the river Lune just above Lancaster, 1830.

I found they were still there in 1874, but I am told they have now disappeared.

Paludina achatina (*Drap.*) [= **Vivipara vivipara** (*Linné*)]. Canal at Birmingham; also at Tunbridge, 1842.

P. vivipara (*Auctt.*) [= **Vivipara contecta** (*Millet*)].—Plentiful in ditches at Birkdale.

When a small reservoir at Beswick, near Manchester, was emptied and cleaned out some years ago, there were large numbers of this species in the mud, and the children of the neighbourhood enjoyed

eating them, calling them "Winkles." I believe my father introduced them into the reservoir, as he was fond of trying to naturalize shells in places which he thought suitable.

Physa acuta *Drap.*—Plentiful in some of the glass-houses at Kew, 1839.

Planorbis albus *Müll.*—Prestwich Clough, near Manchester.

P. contortus (*Linné*).—"Occurs near an old horse-tram line which crosses the Ribble a little above the railway bridges and runs up a steep hill into Preston. The shells are found in a ditch about half-way up the hill, 1834.—T.G."

P. corneus (*L.*) var. **albina**.—York and Scarborough, 1847.

Pupa [Jaminia] secale *Drap.*—Kendal, Westmorland, 1835.

Succinea pfeifferi *Rossm.* [= **S. elegans** *Risso* var.].—Plentiful at Beaumaris; also at Egremont, 1836.

Vitрина pellucida (*Müller*).—"Common about Preston among leaves in shady woods; also about Blackburn, Hough-end-Clough, etc., 1820.—T.G."

Valvata piscinalis (*Müller*).—On the weir at Lancaster, 1830.

BIVALVES.

Anodonta cygnæa (*L.*).—

var. **cellensis**.—A specimen was found in the Island-pond at Smedley Old Hall, Manchester, in 1830. Length 3·62 ins., breadth 6·5 ins.

var. **pallida**.—Plentiful at Bedford, 1845. Length 0·87 ins., breadth 1·87 ins.

My father was always an early riser, and in the year 1845, before railways intersected the country, we were posting to Cambridge. When we reached Bedford it was midnight, and no horses could be procured, so we were obliged to sleep there. Next morning, when the rest of the party were just creeping down to breakfast, my father came in from his early stroll triumphantly producing a goodly number of *Cygnæa pallida*, a shell then new to him.

A. contorta [= **A. cygnæa**, distorted var.].—Repton, Derbyshire, 1836.

Cyclas amnica *Flem.* [= **Pisidium amnicum** *Müll.*].—Plentiful in the river Lune at Lancaster, 1830.

C. calyculata *Drap.* [= **Sphærium lacustre** (*Müll.*)].—Ponds at Chorlton, Lancashire, and Sale, Cheshire, 1828.

C. cornea *Drap.* [= **Sph. corneum** (*L.*)].—

var. **flavescens**.—"Found in the year 1835 near Ambleside under stones in the river which flows into Windermere. It is a light yellow colour.—T.G."

I was at Windermere in 1902 and found the shell swarming along the western side of the lake.

C. pusilla *Turton* [= **Pisidium pusillum** (*Gmelin*)].—"Very common in ditches that are at times nearly dried up. It is particularly abundant near the signal posts opposite Liverpool, 1836.—T.G."

Dreissena [**Dreissensia**] **polymorpha** (*Pallas*).—"Is supposed to have been introduced by some foreign vessel. Be that as it may, it has become universally distributed throughout the kingdom. It is difficult to say how it got into the reservoir at Beswick, but it has increased there to a marvellous extent.—T.G."

Mysca pictorum *Turton* [= **Unio pictorum** *L.*].—"Common in canals. It is particularly fine in the great military canal, Kent.—T.G."

M. solida *Turton* [= **Unio tumidus** *Retz.*].—"Occurs in deep slow rivers. It may be found near Welshpool.—T.G."

Unio deshayesi *Mich.* [= **Unio pictorum** *L.*].—"Has been found in the river Weaver above Weaverham; also at Bolton Bridge, Yorks., a short distance below a place called the Strid.—T.G."

U. margaritifer (*L.*).—River Lune at Caton, near Lancaster; Conway at Llanrwst; and in the river at Ambleside, 1835.

var. **sinuata**.—Windermere, 1835.

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"**Monograph of the Land and Freshwater Mollusca of the British Isles**," by JOHN W. TAYLOR (part 12, pp. 225-280).

This part concludes *Arion hortensis* and contains *A. circumscriptus*, *A. intermedius*, *Geomalacus maculosus*, *Vitrina pellucida* and commences the genus *Hyalinia* (for which name the author justifies his preference). There are photographs of characteristic habitats of each species by R. Welch of Belfast. An appendix of eighteen pages containing much information regarding the various slugs brings our knowledge of these down to date. The coloured plate—particularly successful as regards the *Milaxes*—includes four varietal forms of *Agriolimax agrestis*, four of *A. levvis*, six of *Milax gagates*, and six of *M. sowerbyi*.

"**A Pocket Guide to the British Non-Marine Mollusca**," by E. W. SWANTON (Lockwood, 2/6).

The author has taken the last "List of British Non-Marine Mollusca" published by the Conchological Society, and has described each species and variety. A number follows the name of each species indicating the extent of its range as given in the latest census published by the Conchological Society. The ten alien species are described in small type, and the sixteen fossil forms in italics.

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OF GREAT BRITAIN AND IRELAND.

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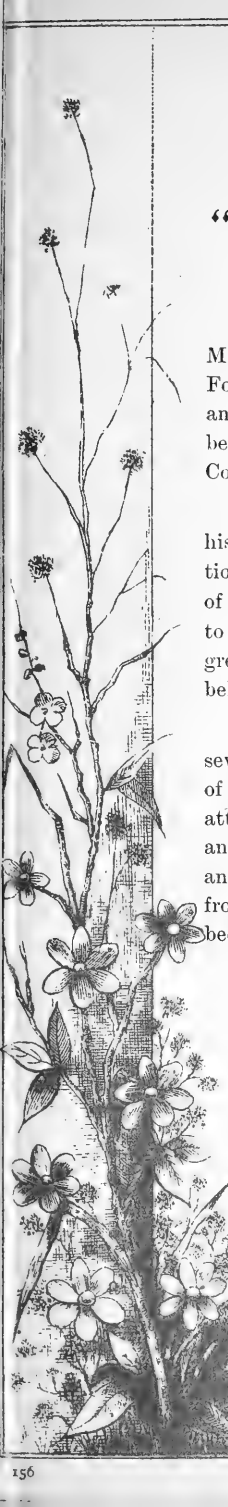
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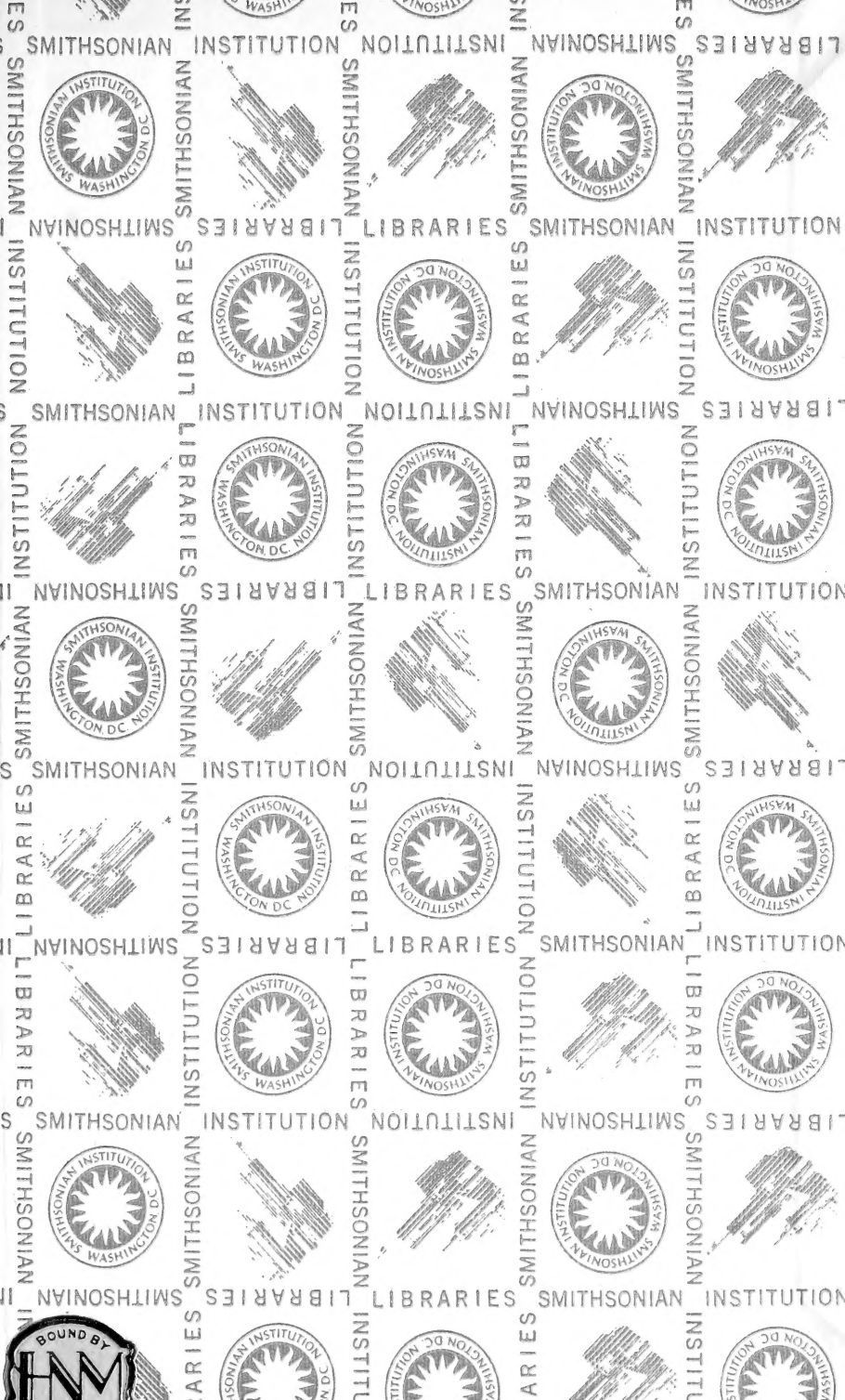
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